User Manual

WIP AT Commands User Guide (WIPSoft v5.11)

Reference: **WM_DEV_OAT_UGD_076**

Revision: **003**

Date: **December 15, 2008**

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AT Commands User Guide for Wavecom IP v5.11

Preliminary

Reference: WM_DEV_OAT_UGD_076
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Overview

The aim of this document is to provide Wavecom customers with a full description of the Wavecom AT commands associated with the Wavecom IP feature.

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Document History

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001	March 14 2008	Creation	Wavecom
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003	December 15, 2008	Update for WIPSoft v5.11	Wavecom

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1 Introduction

The aim of this document is to provide Wavecom customers with a full description of the Wavecom AT commands associated with the Wavecom IP feature.

1.1 Related Documents

None

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1.2 Abbreviations and Definitions

1.2.1 Abbreviations

APN	Access Point Name
ASCII	American Standard Code for Information Interchange
AT	ATtention
BCC	Blind Carbon Copy
CC	Carbon Copy
CHAP	Challenge Handshake Authentication Protocol
CHV	Card Holder Verification
CID	Context IDentifier
CMUX	Converter Multiplexer
CPU	Central Processing Unit
DNS	Domain Name System
GGSN	Gateway GPRS Support Node
GPRS	General Packet Radio Service
GSM	Global System for Mobile communicatio006E
HTTP	Hyper Text Transfer Protocol
IP	Internet Protocol
IPCP	Internet Protocol Control Protocol
M	Mandatory
MS	Mobile Station
N/A	Not Applicable
MSCHAP	MicroSoft Challenge Handshake Authentication
MSS	Maximum Segment Size
NU	Not Used
O	Optional
OS	Operating System
PAP	Password Authentication Protocol
PDP	Packet Data Protocol
PIN	Personal Identity Number
POP3	Post Office Protocol
PPP	Point-to-Point Protocol
SIM	Subscriber Information Module
SMTP	Simple Mail Transfer Protocol
TCP	Transmission Control Protocol
TOS	Type Of Service
TTL	Time To Live
UART	Universal Asynchronous Receiver Transmitter
UDP	User Data Protocol
URL	Uniform Resource Locator
WIP	Wavecom Internet Protocol

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1.3 Logos

This picture indicates the +WIND indication from which the AT command is allowed. X values can be: 1, 3, 4, 16.

This picture indicates that a SIM card must be inserted to support the AT command.

This picture indicates that an AT command is supported even if the SIM card is absent.

This picture indicates that the PIN 1 /CHV 1 code must be entered to support the AT command.

This picture indicates that an AT command is supported even if the PIN 1 /CHV 1 code is not entered.

This picture indicates that the PIN 2 /CHV 2 code must be entered to support the AT command.

This picture indicates that an AT command is supported even if the PIN 2/CHV 2 code is not entered.

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1.4 AT Commands Presentation Rules

The AT commands to be presented in the document are as follows:

- A "Description" section as Heading 3 provides general information on the AT command (or response) behavior.
- A "Syntax" section as Heading 3 describes the command and response syntaxes and all parameters description.
- A "Parameters and Defined Values" section as Heading 3 describes all parameters and values.
- A "Parameter Storage" as Heading 3 presents the command used to store the parameter value and/or the command used to restore the parameter default value.
- An "Examples" section as Heading 3 presents the real use of the described command.
- A "Note" section as Heading 3 can also be included indicating some remarks about the command use.

Figures are provided where necessary.

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2 AT Command Syntax

This section describes the AT command format and the default value for their parameters.

2.1 Command Line

Commands always start by the standard prefix “AT+WIP” and end with the <CR> character. Optional parameters are shown in brackets [ ].

Example:
AT+WIPcmd=<Param1>[,<Param2>]
<Param2> is optional. When the AT+WIPcmd is executed without <Param2> the default value of <param2> is used.

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2.2 Information Responses and Result Codes

Responses start and end with <CR><LF>, except for the ATV0 DCE response format and the ATQ1 (result code suppression) commands.

- If command syntax is incorrect, the "ERROR" string is returned.
- If command syntax is correct but transmitted with wrong parameters, the "+CME ERROR: <Err>" or "+CMS ERROR: <SmsErr>" strings is returned with adequate error codes if CMEE was previously set to 1. By default, CMEE is set to 0, and the error message is only "ERROR".
- If the command line has been executed successfully, an "OK" string is returned.

In some cases, such as "AT+CPIN?" or (unsolicited) incoming events, the product does not return the "OK" string as a response.
In the following examples <CR> and <CR><LF> are intentionally omitted.

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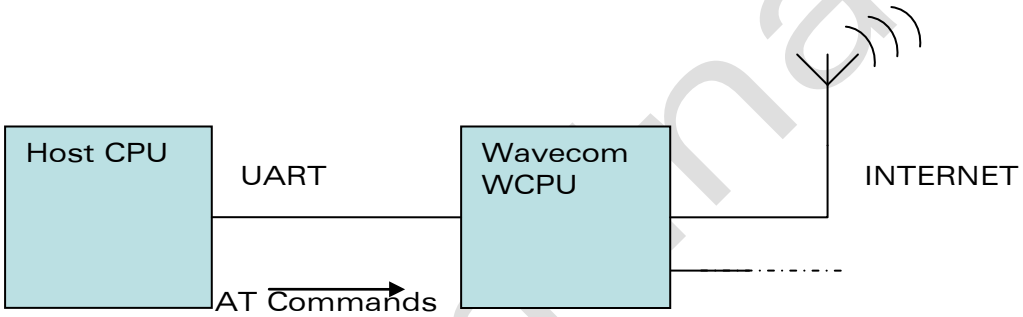
3 Principles

The wipSoft is an Open AT® application that implements the TCP/IP protocols using custom AT commands. This Open AT® application operates in co-operative mode and must be downloaded to the Wavecom Wireless CPU®. The commands are sent from an external application and the corresponding responses are sent back from the Wavecom Wireless CPU® to the external application. The wipSoft uses the APIs provided by wipLib and provides custom AT command interface to the external application.
AT+WIP commands involve:

- a host computer, which issues AT+WIP commands
- wavecom's wireless CPU®
- the rest of the Internet / Intranet



Multiplexing: Several sockets can be operating at once. The +WIPDATA command allows to temporarily identify the UART in data mode with a given socket. The data written on UART is transferred through the socket. The data which arrives on the socket can be read from the UART.
In AT mode, the host receives an unsolicited event when the data arrives on the socket.
Multiple UARTs: There can be several UARTs simultaneously active at once, and different UARTs can map a different socket simultaneously. However, it is a forbidden to map a single socket on several UARTs simultaneously.

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3.1 Sockets Identification

Sockets are identified by a pair of numbers: the first one identifies the protocol; the second one identifies a given socket of this protocol.

3.1.1 Possible Protocols

The possible protocols are,

- 1 = UDP
- 2 = TCP in connect mode (Client)
- 3 = TCP in listen mode (Server)
- 4 = FTP
- 5 = HTTP
- 6 = SMTP
- 7 = POP3

Two pairs with a different protocol number but the same index identify two distinct sockets.
Example: Both 1,7 and 2,7 are valid identifiers simultaneously; the former identifies a UDP socket and the later, a TCP connected socket.

3.1.2 Number of Sockets

The number of sockets per protocol is limited.

- UDP : 8 sockets
- TCP Clients : 8 sockets
- TCP Servers : 4 sockets

3.1.3 Notes

The creation of basic sockets (TCP/UDP) is not commercial but other features are locked by a commercial feature named "internet plug-in". The WIP Soft commands used for socket/session creation will return a "+CME ERROR: 839" error code if the feature is not enabled. To enable the features, you can refer to Open AT® Firmware AT user guide (especially the AT+WCFM command) and we recommend you to contact your Wavecom distributor or sales point for further details.

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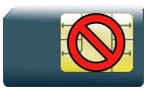
4 General Configuration

4.1 IP Stack Handling +WIPCFG



4.1.1 Description

The +WIPCFG command is used for performing the following operations:

- start TCP/IP stack
- stop TCP/IP stack
- configuring TCP/IP stack
- displaying version information

4.1.2 Syntax

- if<mode>=0,1

Action Command
AT+WIPCFG=<mode>
OK

- if <mode>=2

Action Command
AT+WIPCFG=<mode>,<opt num>,<value>
OK

- if <mode>=3

Action Command
AT+WIPCFG=<mode>
WIP soft vXX.YY.ZZ on Open AT OS vA.B
MMM-DDD-YYYY HH:MM:SS <WIPlib: version number> <WIPSoft: version number>
OK

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- if <mode>=4

Action Command

AT+WIPCFG=<mode>,<action>

OK

Read Command

AT+WIPCFG?

+WIPCFG: <optnum>,<value>

[+WIPCFG: <optnum>,<value>[..]]

OK

Test Command

AT+WIPCFG=?

OK

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4.1.3 Parameters and Defined Values

<mode>:		requested operation
	0	stop TCP/IP stack
	1	start TCP/IP stack
	2	configure TCP/IP stack
	3	display TCP/IP application version
	4	TCP/IP stack configuration management
<opt num>:		configuration option identifier
	0	WIP_NET_OPT_IP_TTL – Default TTL of outgoing data grams This option is a limit on the period of time or number of iterations or transmissions that a unit of data can experience before it should be discarded. The time to live (TTL) is an 8-bit field in the Internet Protocol (IP) header. It is the 9th octet of 20. The default value of this parameter is 64. Its value can be considered as an upper bound on the time that an IP datagram can exist in an internet system. The TTL field is set by the sender of the datagram, and reduced by every host on the route to its destination. If the TTL field reaches zero before the datagram arrives at its destination, then the datagram is discarded. This is used to avoid a situation in which an undelivered datagram keeps circulating in the network. range: 0-255 (default value: 64)

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	1	WIP_NET_OPT_IP_TOS – Default TOS of outgoing parameters The IP protocol provides a facility for the Internet layer to know about the various tradeoffs that should be made for a particular packet. This is required because paths through the Internet vary widely in terms of the quality of service provided. This facility is defined as the "Type of Service" facility, abbreviated as the "TOS facility". The TOS facility is one of the features of the Type of Service octet in the IP datagram header. The Type of Service octet consists of following three fields: 0 1 2 3 4 5 6 7 +-----+-----+-----+-----+-----+-----+-----+-----+ | | | | | PRECEDENCE | TOS | MBZ | | | | | +-----+-----+-----+-----+-----+-----+-----+-----+ The first field is "PRECEDENCE". It is intended to denote the importance or priority of the datagram. The second field is "TOS" which denotes how the network should maintain the tradeoffs between throughput, delay, reliability, and cost. The last field is "MBZ" (Must Be Zero"), is currently unused and is set to 0. The TOS field can have the following values: 1000 -- minimize delay 0100 -- maximize throughput 0010 -- maximize reliability 0001 -- minimize monetary cost 0000 -- normal service For more information on this field please refer to RFC1349. range: 0-255 (default value: 0)
	2	WIP_NET_OPT_IP_FRAG_TIMEO - Time to live in seconds of incomplete fragments When a datagram's size is larger than the MTU (Maximum Transmission Unit) of the network, then the datagram is divided into smaller fragments. These divided fragments are sent separately. The "WIP_NET_OPT_IP_FRAG_TIMEO" option specifies the Time to live for these fragments. range: 1-65535 (default value: 60)

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	3	WIP_NET_OPT_TCP_MAXINITWIN – Number of segments of initial TCP window This option is used to specify the number of segments in the initial TCP window. A TCP window specifies the amount of outstanding (unacknowledged by the recipient) data a sender can send on a particular connection before it gets an acknowledgment back from the receiver. The primary reason for the window is congestion control. range: 0-65535 (default value: 0)
	4	WIP_NET_OPT_TCP_MIN_MSS - Default MSS of off-link connections This option is used by the Open AT Plug-in WIP Lib internally. This parameter specifies the maximum size of TCP segment which would be sent. By default, the value of this parameter is set to 536. Hence Open AT Plug-in WIP Lib would not send any TCP segment having a length greater than 536 bytes without header. range: 536-1460 (default value: 536)
	5	WIP_NET_OPT_DEBUG_PORT This option is used to specify the port on which the debug traces are to be sent. range: 0-3 (default value: 0)
	12	AT_WIP_NET_OPT_PREF_TIMEOUT_VALUE - Used for TCP sockets to configure the packet segmentation on IP network side This option is used to specify the maximum time to wait between two successive data chunks received from the mapped UART/serial port (please see +WIPDATA AT command). It allows the application to buffer a certain amount of data before writing on IP network side.

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		Each unit in the range represents 100 msec. For example, value 10 for this option will give a wait time of 1sec (10 *100mesc). Default value for AT_WIP_NET_OPT_PREF_TIMEOUT_VALUE option is 0. This value means that no specific process is done to avoid TCP packets segmentation: data are written onto IP network without any delay after the reception of data from the mapped UART/serial port (please see +WIPDATA AT command). In this case some TCP packets sent on the IP network may be smaller than TCP_MIN_MSS value. Setting e.g. a 10 value for this option will make the application to wait at least 1 second or twice the TCP_MIN_MSS value to be reached before sending data on IP network. In this case, TCP packets size sent on the IP network should be equal to at least TCP_MIN_MSS (Default value = 536 bytes). range: 0- 100 (default value: 0)
	13	AT_WIP_NET_OPT_ESC_SEQ_NOT_SENT : Used to configure whether a "+++" escape sequence should be sent as data to the peer. By default, this option is set to 0 which means that the "+++"sequence is sent to the peer as data. If set to 1, "+++"sequence is not sent as data to the peer. range: 0 -1(default value:0)
	14	AT_WIP_NET_OPT_AUTO_SWITCH - 0: Does not switch automatically to AT mode 1: Switches automatically to AT mode range: 0-1 (default value:0)
<action>:		requested operation on TCP/IP stack parameter management
	0	configuration storage (when existing) is freed
	1	stores the configuration parameters
<value>:		value range for different configuration options
<XX.YY.ZZ >:		WIP soft release version
<A.B>:		Open AT® OS release version
<MM-DD-YYYY>:		date of built of WIP Soft application
<HH:MM:SS>:		time of built of WIP Soft application
<WIPlib: version number>:		WIP Lib version

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<WIPSoft: version number>:	internally identifying WIP Soft version

Note: (WIP_NET_OPT_SOCK_MAX + 1) sockets are reserved when UDP sockets are created (and not for TCP sockets); one socket buffer is added to support/afford DNS accesses

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4.1.4 Parameter Storage

Only one IP stack configuration set can be saved into the FLASH memory.

- "AT+WIPCFG=4,1" is used to store the TCP/IP stack configuration parameters into the FLASH memory
- "AT+WIPCFG=4,0" is used to free the TCP/IP stack configuration storage

Executing "AT+WIPCFG=1" will apply default parameters when existing. Still it is possible to change option values at run time using "AT+WIPCFG=2,<optnum>,<optvalue>".

4.1.5 Possible Errors

The possible error message is displayed only if "AT+CMEE=1" is activated else "ERROR" is displayed.

"+CMEE" AT error code	Description
800	invalid option
801	invalid option value
802	not enough memory left
820	error writing configuration in FLASH memory
821	error freeing configuration in FLASH memory
844	stack already started
850	initialization failed

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4.1.6 Examples

Command	Responses
AT+WIPCFG=1 *Note: Start IP Stack*	OK
AT+WIPCFG?	+WIPCFG: 0,64 +WIPCFG: 1,0 +WIPCFG: 2,60 +WIPCFG: 3,0 +WIPCFG: 4,536 +WIPCFG: 5,0 +WIPCFG: 6,8 +WIPCFG: 7,32 +WIPCFG: 8,0 +WIPCFG: 9,0 +WIPCFG: 10,4 +WIPCFG: 11,4 +WIPCFG: 12,10 +WIPCFG: 13,0 +WIPCFG: 14,0 OK
AT+WIPCFG=2,0,10 *Note: Configure TTL of IP Stack*	OK

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Command	Responses
AT+WIPCFG?	+WIPCFG: 0,10 +WIPCFG: 1,0 +WIPCFG: 2,60 +WIPCFG: 3,0 +WIPCFG: 4,536 +WIPCFG: 5,0 +WIPCFG: 6,8 +WIPCFG: 7,32 +WIPCFG: 8,0 +WIPCFG: 9,0 +WIPCFG: 10,4 +WIPCFG: 11,4 +WIPCFG: 12,10 +WIPCFG: 13,0 +WIPCFG: 14,0 OK
AT+WIPCFG=3 *Note: Display software version*	WIP soft v202 on Open AT OS v312 Mar 26 2007 11:45:46 WIPlib:v2a07 WIPSoft:v1a12 OK
AT+WIPCFG=0 *Note: Stop the TCP/IP Stack*	OK
AT+WIPCFG=4,1 *Note: Store IP configuration parameters into FLASH*	OK
AT+WIPCFG=4,0 *Note: Free IP configuration parameters stored in FLASH*	OK

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4.1.7 Notes

It is recommended to change the default settings of the WIP stack using +WIPCFG only when it is required. Changing the parameter values especially the max number of sockets and the max TCP buffer size with the high values lead to over consumption of the stack memory which causes the WIP Soft to crash. Hence, care must be taken when the default settings of the stack is changed using +WIPCFG command.

Following option values set by +WIPCFG command are taken into consideration at the run time. The below option values except for AT_WIP_NET_OPT_PREF_TIMEOUT_VALUE and AT_WIP_NET_OPT_ESC_SEQ_NOT_SENT will be taken into consideration at next start up only if these are saved in the flash before stopping the stack.

- WIP_NET_OPT_IP_TTL
- WIP_NET_OPT_IP_TOS
- WIP_NET_OPT_IP_FRAG_TIMEO
- WIP_NET_OPT_TCP_MAXINITWIN
- WIP_NET_OPT_TCP_MIN_MSS
- WIP_NET_OPT_DEBUG_PORT
- AT_WIP_NET_OPT_PREF_TIMEOUT_VALUE
- AT_WIP_NET_OPT_ESC_SEQ_NOT_SENT
- AT_WIP_NET_OPT_AUTO_SWITCH

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4.2 Bearers Handling +WIPBR

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4.2.1 Description

The +WIPBR command can be used to

- select the bearer
- start/close the bearer
- configure different bearer options such as access point name

4.2.2 Syntax

- if <cmdtype>=0,1 or 5

Action Command
AT+WIPBR=<cmdtype>,<bid>
OK

- if <cmdtype>=2

Action Command
AT+WIPBR=<cmdtype>,<bid>,<opt num>,<value>
OK

- if <cmdtype>=3

Action Command
AT+WIPBR=<cmdtype>,<bid>,<opt num>
+WIPBR: <bid>,<opt num>,<value>
OK

- if <cmdtype>=4

Action Command
AT+WIPBR=<cmdtype>,<bid>,<mode>[,<login>,<password>,[<caller identity>]]
OK

- if <cmdtype>=6

Action Command
AT+WIPBR=<cmdtype>,<bid>,<mode>
OK

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Read Command
AT+WIPBR?
<bid>,<state>
[<bid>,<state>[..]]
OK

Test Command
AT+WIPBR=?
OK

- if <mode>=1

Unsolicited response
+WIPBR: <bid>,<status>,<local IP @>,<remote IP @>,<DNS1 @>, <DNS2 @>

4.2.3 Parameters and Defined Values

<cmd type>:		type of command
	0	close bearer
	1	open bearer
	2	set value of different bearer options
	3	get value of different bearer options
	4	start bearer
	5	stop bearer
	6	bearer configuration management
<bid>:		bearer Identifier
	1	UART1
	2	UART2
	3	N/A
	4	N/A
	5	GSM
	6	GPRS
	11..14	CMUX port over UART1
	21..24	CMUX port over UART2
<opt num>:		bearer option identifier

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0	WIP_BOPT_LOGIN – username (string) max: 64 characters
1	WIP_BOPT_PASSWORD – password (string) max: 64 characters
2	WIP_BOPT_DIAL_PHONENB – phone number (string) max: 32 characters
5	WIP_BOPT_DIAL_RINGCOUNT - Number of rings to wait before sending the WIP_BEV_DIAL_CALL event range: 0-65535
6	WIP_BOPT_DIAL_MSNULLMODEM - Enable MS-Windows null-modem protocol ("CLIENT"/"SERVER" handshake) range: 0-1
7	WIP_BOPT_PPP_PAP - Allow PAP authentication range: 0-1
8	WIP_BOPT_PPP_CHAP - Allow CHAP authentication range: 0-1
9	WIP_BOPT_PPP_MSCHAP1 - Allow MSCHAPv1 authentication range: 0-1
10	WIP_BOPT_PPP_MSCHAP2 - Allow MSCHAPv2 authentication range: 0-1
11	WIP_BOPT_GPRS_APN - Address of GGSN (string) max: 96 characters
12	WIP_BOPT_GPRS_CID - Cid of the PDP context range: 1-4
13	WIP_BOPT_GPRS_HEADERCOMP - Enable PDP header compression range: 0-1
14	WIP_BOPT_GPRS_DATACOMP - Enable PDP data compression range: 0-1
15	WIP_BOPT_IP_ADDR - Local IP address (IP/string)
16	WIP_BOPT_IP_DST_ADDR - Destination IP address (IP/string)
17	WIP_BOPT_IP_DNS1 - Address of primary DNS server (IP/string)

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	18	WIP_BOPT_IP_DNS2 - Address of secondary DNS server (IP/string)
	19	WIP_BOPT_IP_SETDNS - Configure DNS resolver when connection is established range: 0-1
	20	WIP_BOPT_IP_SETGW - Set interface as default gateway when connection is established range: 0-1
	21	WIP_BOPT_GPRS_TIMEOUT - Define a time limit to connect GPRS bearer. For example, value 300 for this option sets a wait time of 30s (300*100ms). Note: If timer expires before GPRS bearer connects, error 847 is returned. range: 300-1200 (default: 1200).
<value>:		range of value for different bearer options
<mode>:		mode of operation
	0	client
	1	server
<state>:		current state of the bearer
	0	stopped
	1	started
<status>:		result of the connection process
	0	successful
	any other value	to be matched to error code value (e.g. "814" means PPP authentication failure)
<local IP @*>:		local IP address
<remote IP @*>:		remote IP address. (first node in internet)
<DNS1 IP @*>:		Domain Name Server address
<DNS2 IP @*>:		Domain Name Server address
<login>:		PPP login
<passwd>:		PPP password
<caller identity>:		optional ASCII string (type ascii*). If not specified, then target will accept all DATA calls (independently of caller identification). If specified, then target will only accept calls from <caller identity>(which is the GSM data call number of the GSM client).

* IP @ are displayed in alpha numeric dot format. e.g. 192.168.0.1...When no IP address is known, "0.0.0.0" is displayed.

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Caution: The options WIP_BOPT_IP_ADDR, WIP_BOPT_IP_DST_ADDR, WIP_BOPT_IP_DNS1 and WIP_BOPT_IP_DNS2 can be read after the bearer connection is established successfully. If an attempt is made to read the options value before the bearer connection is established successfully, incorrect IP address will be received.

4.2.4 Parameter Storage

Several bearer configuration set can be saved.
Calling twice AT+WIPBR=6,<bid>,1 with the same <bid> will store the last configuration set.

- "AT+WIPBR=6,<bid>,1" is used to store the bearer configuration parameters set associated with the bearer <bid> into the FLASH memory.
- "AT+WIPBR=6,<bid>,0" is used to free the bearer configuration parameters set associated with the bearer <bid>.

Executing "AT+WIPBR=1,<bid>" will open bearer <bid> with default parameters of the bearer when existing.

4.2.5 Possible Errors

The possible error message is displayed only if "AT+CMEE=1" is activated else "ERROR" is displayed.

"+CMEE" AT error code	Description
800	invalid option
801	invalid option value
802	not enough memory left
803	operation not allowed in the current WIP stack state
804	device already open
807	bearer connection failure : line busy
808	bearer connection failure : no answer
815	bearer connection failure : PPP authentication failed
816	bearer connection failure : PPP IPCP negotiation failed
820	error writing configuration in FLASH memory
821	error freeing configuration in FLASH memory
847	bearer connection failure: WIP_BOPT_GPRS_TIMEOUT time limit expired before GPRS bearer connected
848	impossible to connect to the bearer
849	connection to the bearer has succeeded but a problem has occurred during the data flow establishment

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4.2.6 Examples

Command	Responses
AT+WIPBR?	1,0 6,1 OK *Note: Bearer UART1 is open but not started bearer GPRS is open and started*
AT+WIPBR?	OK *Note: No bearer has been opened yet*
AT+WIPBR=1,6 *Note: Open GPRS bearer*	OK
AT+WIPBR=2,6,11,"APN name" *Note: Set APN of GPRS bearer*	OK
AT+WIPBR=3,6,11 *Note: Get APN of GPRS bearer*	+WIPBR: 6,11,"APN name" OK
AT+WIPBR=2,6,21,600 *Note: set GPRS connection timeout value to 60s*	OK
AT+WIPBR=4,6,0 *Note: Start GPRS bearer*	OK
AT+WIPBR=5,6 *Note: Stop GPRS bearer*	OK
AT+WIPBR=0,6 *Note: Close GPRS bearer*	OK
AT+WIPBR=1,5 *Note: Open GSM bearer*	OK
AT+WIPBR=2,5,0,"login" *Note: Set the login for GSM bearer*	OK
AT+WIPBR=2,5,1,"password" *Note: Set the password for GSM bearer*	OK
AT+WIPBR=2,5,2,"phonenumber" *Note: Set the phonenumber for GSM bearer*	OK
AT+WIPBR=2,5,15,"1.1.1.1" *Note: Set the local IP address for GSM bearer*	OK

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Command	Responses
AT+WIPBR=2,5,16,"2.2.2.2" *Note: Set the destination IP address for GSM bearer*	OK
AT+WIPBR=3,5,15 *Note: Read the local IP address for GSM bearer*	+WIPBR: 5,15,"0.0.0.0" OK *Note: Local IP address is not set as GSM bearer is still not connected*
AT+WIPBR=3,5,16 *Note: Read the destination IP address for GSM bearer*	+WIPBR: 5,16,"0.0.0.0" OK *Note: Destination IP address is not set as GSM bearer is still not connected*
AT+WIPBR=4,5,0 *Note: Start the GSM bearer as a client*	OK
AT+WIPBR=3,5,15 *Note: Read the local IP for GSM bearer*	+WIPBR: 5,15,"1.1.1.1" OK
AT+WIPBR=3,5,16 *Note: Read the destination IP for GSM bearer*	+WIPBR: 5,16,"2.2.2.2" OK
AT+WIPBR=5,5 *Note: Stop the GSM bearer*	OK
AT+WIPBR=0,5 *Note: Close the GSM bearer*	OK

4.2.7 Notes

4.2.7.1 For Starting a Bearer

The mandatory parameters to start a bearer in

- server mode: <cmdtype>, <bid>, <mode>, <login> and <password>
- client mode: <cmdtype>, <bid> and <mode>

Depending on the mode and the bearer type, additional parameters are required or forbidden:

Bid	Mode	Other Params
1,3,11,14,21,24	0	None
1,3,11,14,21,24	1	<PPP login>, <PPP password>
5	0	None
5	1	<login>,<password>[,<caller identity>]

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6	0	None

Starting bearer as a server requires additional parameters as mentioned in the above table.

- For PPP server, only parameters <login> and <password> are required. They will be compared with remote PPP client login and password.
- For GSM server, <login> and <password> will be used for PPP over GSM establishment (same behaviour as described for PPP server).

The <caller identity> is an optional ASCII string (type ASCII*). If not specified, then target will accept all DATA calls (independently of caller identification). If specified, then target will only accept calls from <caller identity> (which is the GSM data call number of the GSM client.

Opening bearer only consists in associating the IP protocol stack with the specified bearer. The corresponding bearer setup has to be done through the adequate already existing AT commands (please refer to +WMFM commands for UART1 and UART2, +CMUX command for CMUX virtual ports and GSM/GPRS AT commands).

Several bearer can be opened at the same time but only one bearer can be started at a time.
If both DNS1 and DNS2 are displayed as "0.0.0.0" in the unsolicited message when bearer is opened in server mode, it means that connecting to a remote IP host through an URL will fail.

The options WIP_BOPT_DIAL_REDIALCOUNT and WIP_BOPT_DIAL_REDIALDELAY will not be implemented through AT commands. Nevertheless, for future compatibility reason, Opt num 3 and 4 are kept as reserved.

For GSM bearer, the options WIP_BOPT_IP_ADDR and WIP_BOPT_IP_DST_ADDR will display valid addresses only when the bearer is started and connected, else it will display an address "0.0.0.0".

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5 IP Protocol Services

5.1 Service Creation +WIPCREATE

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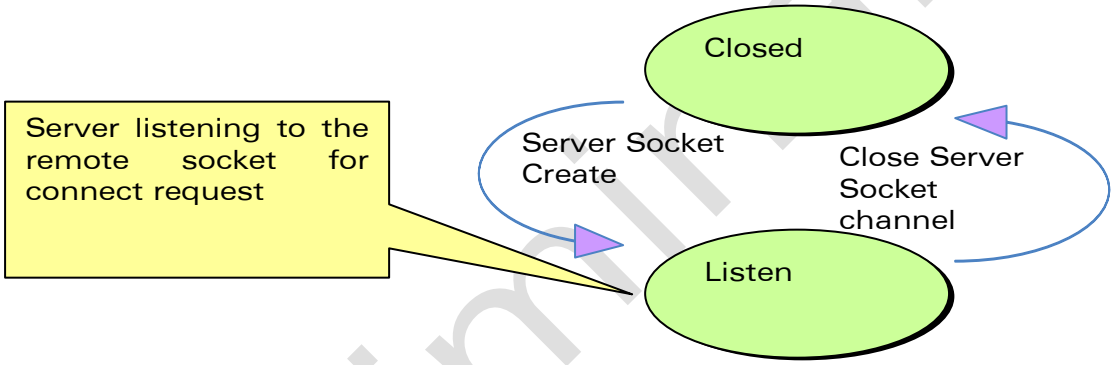
5.1.1 Description

The +WIPCREATE command is used to create UDP, TCP client and TCP server sockets associated with the specified index and FTP/HTTP/SMTP/ POP3 service. Only one FTP/HTTP/SMTP/POP3 session at a time is available.

If a local port is specified while creating a socket, the created socket will be assigned to this port; if not, a port will be assigned dynamically by WIP application. If peer IP and peer port is specified, the created socket will be connected to the specified IP and port.

TCP server cannot be used to transfer data. To transfer data, it creates a local TCP client socket. This process of creating local socket is referred as "spawning". When a server socket is created using, socket passively listens on a specified port for incoming connections. The below mentioned diagram shows different states managed for TCP server.



On reception of a connection request from a remote client socket, a server socket does the following,

- spawns a new socket (client) to connect to the remote socket
- data transfer is done between the spawned socket and the remote socket
- server socket remains in the listening mode and is ready to accept the request from other clients

Below mentioned diagram shows connection establishment procedure.

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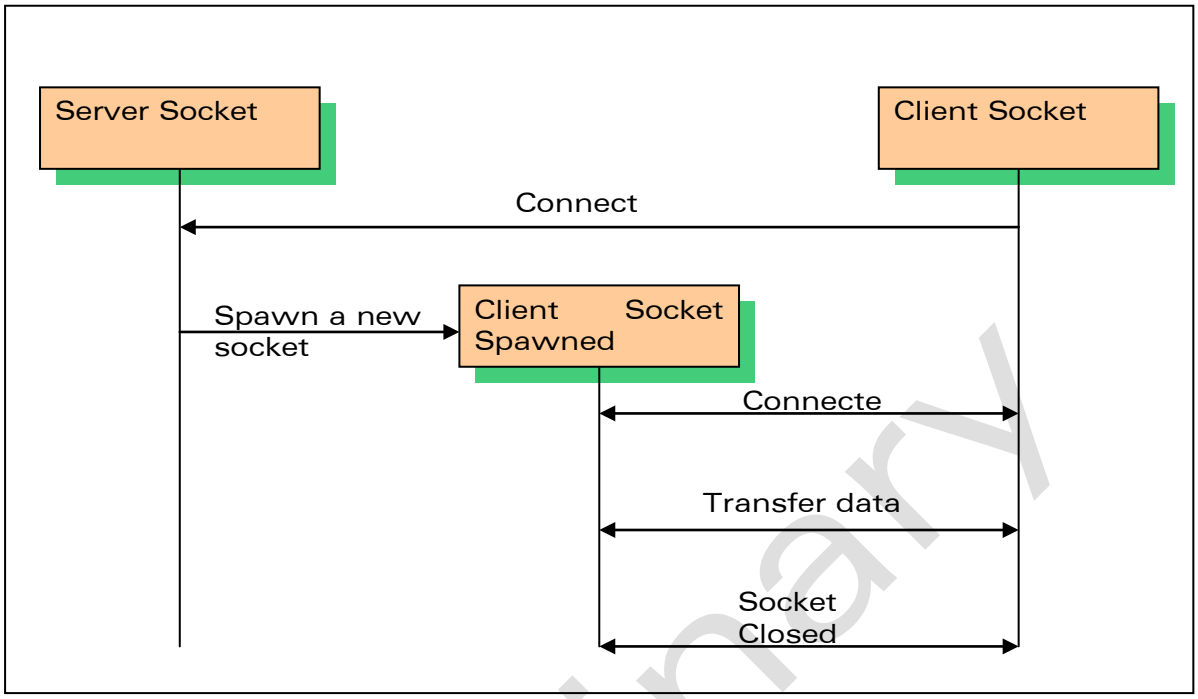

5.1.2 Syntax

- if <mode>=1

Action Command

AT+WIPCREATE=<mode>,<communication index>,[<local port>] [,<peer IP>,<peer port>]

OK

- if <mode>=2

Action Command

AT+WIPCREATE=<mode>,<communication index>,<peer IP>,<peer port>

OK

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- if <mode>=3

Action Command

AT+WIPCREATE=<mode>,<server index>,<local port>,<from idx>,<to idx>

OK

- if <mode>=4

Action Command

AT+WIPCREATE=<mode>,<index>,<server>[,<peer_port>],<username>,

<password>[,<account>]

OK

- if <mode>=5

Action Command

AT+WIPCREATE=<mode>,<index>,[<server>[,<peer port>]][,<username>,<password>][,<header list>[...]]]

OK

- if <mode>=6 or 7

Action Command

AT+WIPCREATE=<mode>,<index>,<server>[,<peer port>][,<username>,<password>]

OK

Read Command

AT+WIPCREATE?

NONE

Test Command

AT+WIPCREATE=?

OK

- if <mode>=1 or 2

Unsolicited response

+WIPREADY: <mode>,<communication index>

- if <mode>=3

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Unsolicited response `+WIPACCEPT: <server index>,<communication idx>`

- if <mode>=5,6 or 7

Unsolicited response `+WIPREADY: <mode>,<index>`

5.1.3 Parameters and Defined Values

<mode>:		specifies type of socket
	1	UDP
	2	TCP Client
	3	TCP server
	4	FTP
	5	HTTP Client
	6	SMTP Client
	7	POP3 Client
<index>:		TCP/UDP/FTP/HTTP/SMTP/POP3 session identifier
<local port>:		local TCP/UDP port
<peer IP>:		peer IP address; a string between quotes indicating an address either in numeric form (e.g. "85.12.133.10") or as a DNS entry (e.g. "www.wavecom.com")
<peer port>:		peer port or the server port For TCP/UDP, this parameter is the port of the peer socket. For FTP,HTTP,SMTP and POP3, this parameter is the server port range: 1-65535 (default value for FTP: 21 default value for HTTP: 80 default value for SMTP: 25 default value for POP3: 110)
<from idx>:		minimum index for spawned TCP sockets range: 1-8
<server index>:		TCP server socket identifier range: 1-4

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<to idx>:	maximum index for spawned TCP sockets range: 1-8
<communication index>:	indexes reserved for spawned sockets It cannot be used by other sockets even if the spawned sockets are not created yet. range: 1-8
<server>:	server address or proxy address This parameter is the server address for FTP, SMTP and POP3 protocol and for HTTP it is proxy server address. It can either be a 32 bit number in dotted-decimal notation (“xxx.xxx.xxx.xxx”) or an alpha numeric string format for hostname.
<user name>:	username for the authentication in string format Authentication is disabled when this parameter is not specified for HTTP, SMTP and POP3.
<password>:	password for the authentication in string format Authentication is disabled when this parameter is not specified for HTTP, SMTP and POP3.
<account>:	account information of the user in string format This is required by some FTP server during authentication phases.
<header list>:	HTTP header message (name-value pair) The first string in the message header field is the name of the header and the second string is the value of the header.
<...>	additional HTTP message header fields more pairs(name, value) of HTTP message header field can be added

5.1.4 Parameter Storage

None

5.1.5 Possible Errors

“+CMEE” AT error code	Description
3	operation not allowed
800	invalid option
803	operation not allowed in the current WIP stack state

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"+CMEE" AT error code	Description
830	bad index
832	bad port number
834	not implemented
836	memory allocation error
837	bad protocol
839	error during channel creation
840	UDP/TCP socket or FTP/HTTP/SMTP/POP3 session is already active
842	destination host unreachable (whether host unreachable, Network unreachable, response timeout)
845	attempt is made to reserve/create a client socket which is already reserved/opened by TCP server/client
860	protocol undefined or internal error
861	user name rejected by server
862	password rejected by server
865	authentication error
866	server not ready error

5.1.6 Examples

Command	Responses
AT+WIPCREATE=1,1,80 *Note: Create the UDP socket on local port 80 with communication index = 1 ⇔ Wireless CPU® acts as an UDP server awaiting for incoming datagram on local port 80*	OK *Note: An unsolicited event +WIPREADY: 1,1 will be received once the UDP socket is ready for usage*
AT+WIPCREATE=1,1,"www.wavecom.com",80 *Note: Create the UDP socket on arbitrary free local port with peer IP and peer port 80 with communication index = 1 ⇔ Wireless CPU® acts as a UDP client that can send datagram towards the remote entity*	OK *Note: An unsolicited event +WIPREADY: 1,1 will be received once the UDP socket is ready for usage*
AT+WIPCREATE=1,1,80,"www.wavecom.com",80	OK

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Command	Responses
Note: Create the UDP socket on local port 80 with peer IP and peer port 80 with communication index = 1 ⇔ Wireless CPU® acts as a UDP client and an UDP server : it can send datagram towards the remote entity and receiving datagram on the specified local port.	*Note: An unsolicited event +WIPREADY: 1,1 will be received once the UDP socket is ready for usage*
AT+WIPCREATE=3,1,80,5,8 *Note: Create the TCP server on port 80 with server index=1 ⇔ Wireless CPU® acts as a TCP server : it will from now on spawn TCP client socket from communication index 5 to 8*	OK *Note: An unsolicited event +WIPACCEPT: 1,5 will be received once the TCP server is ready for usage*
AT+WIPCREATE=2,1,"IP ADDR",80	OK
Note: Create the TCP client on port 80 with index=1 ⇔ Wireless CPU® acts as a TCP client : it can from now on communicate with the remote specified entity through communication index 1	*Note: An unsolicited event +WIPREADY: 2,1 will be received once the TCP client is ready for usage*
AT+WIPCREATE=4,1,"ftp.wavecom.com","admin","123456" *Note: Create a FTP session ⇔ towards the remote specified FTP server. Communication index to be used then is 1*	OK
AT+WIPCREATE=5,1,"proxyaddress",,"user name","password","User-Agent","WIP-HTTP-Client/1.0"	OK +WIPREADY: 5, 1 *Note: HTTP session with proxy and 1 message header field* *Use default 80 proxy port number* *1 message header field:* *Message header field name is "User-Agent"* *Message header field value is "WIP-HTTTP-Client/1.0"*
AT+WIPCREATE=5,1,"proxyaddress",,"user name","password","User-Agent","WIP-HTTP-Client/1.0","Accept-Encoding","gzip","Accept-Language","en-US"	OK +WIPREADY: 5, 1

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Command	Responses
	Note: HTTP session with proxy and 3 message header fields *Use default 80 proxy port number* *3 message header fields:* *Message header field name is "User-Agent" and header field value is "WIP-HTTTP-Client/1.0"* *Message header field name is "Accept-Encoding" and header field value is "gzip"* *Message header field name is "Accept-Language" and header field value is "en-US"*
AT+WIPCREATE=5,1,"proxyaddress",,"user","pass"	OK +WIPREADY: 5, 1 *Note: Authentication connection on default proxy server port 80*
AT+WIPCREATE=6,1,"smtp.mail.yahoo.fr","587","user","pass"	OK +WIPREADY: 6, 1 *Note: Connect to SMTP server port 587 with given username and password*
AT+WIPCREATE=7,1,"192.168.1.4","110","user","pass"	OK +WIPREADY: 7, 1 *Note: Connect to POP3 server port 110 with given username and password*
AT+WIPCREATE=7,1, "pop.mail.server.com"	OK +WIPREADY: 7, 1 *Note: Connect to the default port 110 of POP3 server.* *No authentication required*

5.1.7 Notes

The maximum number of sockets can be set to 23 so that WIP soft can handle in the same time either one FTP session (in passive mode)/HTTP/SMTP/POP3, 8 UDP sockets, 8 TCP client sockets and 4 TCP servers.

Starting a TCP server requires to specify the maximum number of communication sockets that can be spawned. This can be done using <from idx> and <to idx> parameters. Note that the value set for <to idx> should be equal or more than <from idx>.

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The maximum communication socket that can be created using WIP Soft is 8. Hence, the range for <communication index> and <from idx>, <to idx> is 1-8. Note that the spawned communication socket and the TCP client socket share the same communication index.

It is not possible to create a client socket with AT+WIPCREATE=2, x, y, z when x is already reserved by a server with AT+WIPCREATE=3,<server idx>, <local port>,a,b where a≤x≤b. Similarly, it is not possible to reserve a range with AT+WIPCREATE=3, <server idx>, <local port>, a, b if one of the TCP client socket indexes between a and b is already reserved, be it by a client or a server range

The <from idx> and <to idx> are reserved for the server socket till the server socket and the spawned sockets are closed explicitly. So when trying to create a new TCP server socket, the <from idx> and <to idx> should be different from what was used earlier. A parameter used as <from_idx> can't be used as <to_idx> anymore for other TCP server socket creation until spawned sockets with specified <from_idx> and <to_idx> are closed along with the TCP server socket explicitly and vice versa.

When no more communication index is available in the TCP server's range (or no more resources to accept new incoming connections), any peer trying to connect to the server will receive an accept () immediately followed by a shutdown () ("peer close").

It is possible to have a TCP client and TCP server sockets running at the same time in the same Wireless CPU. In this scenario, when the connection is established between the TCP server and TCP client sockets, it is necessary to unmap the mapped socket on one index in order to send/receive data on socket which is created on another index. It is possible to use CMUX logical ports and can have an interface connection (like UART connection) for each socket for e.g. TCP client socket on one logical port and TCP server socket on another. In this case, it is not necessary to map or unmap the UART connections to send or receive the data from the socket.

The +WIPCREATE command causes the connection and authentication to the FTP server. If several file uploads and retrievals are required to/from the same server, a single connection with +WIPCREATE is needed. Then, each file operation will be done (one +WIPFILE command per operation), and the FTP connection will be released with +WIPCLOSE.

SIM card is required only if FTP session is established through GSM or GPRS. An FTP session upon an UART will work without a SIM card.

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5.2 Closing a Service +WIPCLOSE

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5.2.1 Description

The +WIPCLOSE command is used to close a socket or FTP/HTTP/SMTP/POP3 session. When one serial port (UART or CMUX DLCI) is used to map a socket for read/write operations, [ETX] character can also be used to close the socket.
An unsolicited event is generated, when socket or FTP/HTTP/SMTP/POP3 session is closed.

5.2.2 Syntax

Action command

AT+WIPCLOSE=<protocol>,<idx>

OK

Read Command

AT+WIPCLOSE?

NONE

Test Command

AT+WIPCLOSE=?

OK

Unsolicited response

+WIPPEERCLOSE: <protocol>,<idx>

5.2.3 Parameters and Defined Values

<protocol>: protocol type

1	UDP
2	TCP client
3	TCP server
4	FTP
5	HTTP
6	SMTP
7	POP3

<idx>: socket identifier or FTP/HTTP/SMTP/POP3 session identifier

This parameter is the index of the socket or FTP/HTTP/SMTP/POP3 session created with +WIPCREATE command.

5.2.4 Parameter Storage

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None

5.2.5 Possible Errors

"+CMEE" AT error code	Description
802	not enough memory
803	operation not allowed in the current WIP stack state
830	bad index
831	bad state
834	not implemented
837	bad protocol

5.2.6 Examples

Command	Responses
AT+WIPCLOSE=1,1 *Note: Close UDP socket with communication index 1*	OK
AT+WIPCLOSE=2,1 *Note: Close TCP client with communication index 1*	OK
AT+WIPCLOSE=3,1 *Note: Close TCP server with communication index 1*	OK
AT+WIPCLOSE=4,1 *Note: Close FTP session with index 1*	OK *Note: An unsolicited event +WIPPEERCLOSE: 4,1 is received once the FTP session is closed*
AT+WIPCLOSE=5,1 *Note: Close HTTP session with index 1*	OK
AT+WIPCLOSE=6,1 *Note: Close SMTP session with index 1*	OK
AT+WIPCLOSE=7,1 *Note: Close POP3 session with index 1*	OK

5.2.7 Notes

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After issuing +WIPCLOSE command, no more data can be sent and received over the socket/session. In case of FTP protocol, the closure of FTP session is indicated by +WIPEERCLOSE unsolicited response when +WIPCLOSE command is used for closing the session.

In case of TCP and UDP sockets, response "OK" is returned when the +WIPCLOSE command is executed irrespective of whether the socket is active or not. But in case of FTP/HTTP/SMTP/POP3 session, "OK" response is returned if +WIPCLOSE command is executed when the session is active else "+CME ERROR: 831" error code is returned.

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5.3 Service Option Handling +WIPOPT

5.3.1 Description

The +WIPOPT command is used to read and/or to configure different parameters on sockets and FTP/HTTP/SMTP/POP3 service.

5.3.2 Syntax

- if <action>=1

Action Command
AT+WIPOPT=<protocol>,<idx>,<action>,<optnum>
OK

- if <action>=2

Action Command
AT+WIPOPT=<protocol>,<idx>,<action>,<optnum>,<optval>
OK

Read Command
AT+WIPOPT?
NONE

Test Command
AT+WIPOPT=?
OK

- if <action>=1

Unsolicited response
+WIPOPT: <protocol>,<optnum>,<optval>

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- if <action>=1 and <protocol>=5 and <optnum>=54

Unsolicited response `+WIPOPT: 5,54,<message header field name>,<message header field value>,[…]`

5.3.3 Parameters and Defined Values

<protocol>:		protocol type
	1	UDP
	2	TCP client
	3	TCP server
	4	FTP
	5	HTTP
	6	SMTP
	7	POP3
<idx>:		socket or FTP/HTTP/SMTP/POP3 session identifier
<action>:		requested operation
	1	read the value of an option
	2	write the value of an option
<optnum>:		option that can be read/written
<optval>:		value of an option

5.3.4 Parameter Storage

None

5.3.5 Possible Errors

"+CMEE" AT error code	Description
800	invalid option
801	invalid option value
803	operation not allowed in the current WIP stack state
830	bad index
834	not implemented
835	option not supported
837	bad protocol
850	unknown reason

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"+CMEE" AT error code	Description
860	protocol undefined or internal error
863	protocol delete error
864	protocol list error

5.3.6 Examples

Command	Responses
AT+WIPOPT=2,1,2,8,20 *Note: Set TTL for TCP client*	OK
AT+WIPOPT=2,1,1,8 *Note: Get TTL for TCP client*	+WIPOPT: 2,8,20 OK
AT+WIPOPT=3,1,2,9,10 *Note: Set TOS for TCP server*	OK
AT+WIPOPT=3,1,1,9 *Note: Get TOS for TCP server*	+WIPOPT: 3,9,10 OK
AT+WIPOPT=1,1,1,1 *Note: Get peer port for UDP*	+WIPOPT: 1,1,80 OK
AT+WIPOPT=4,1,2,40,1 *Note: Set data representation type for FTP*	OK
AT+WIPOPT=4,1,1,40 *Note: Get data representation type for FTP*	+WIPOPT: 4,1,1 OK
AT+WIPOPT=5,1,2,52,0 *Note: Set HTTP version to 1.0*	OK
AT+WIPOPT=5,1,2,53,6 *Note: Set maxredirect to 6*	OK
AT+WIPOPT=5,1,1,52 *Note: Get HTTP version*	+WIPOPT: 5,52,0 OK
AT+WIPOPT=6,1,2,61,"senderaddress@mail.com" *Note: Set the sender address*	OK
AT+WIPOPT=6,1,2,67,0	OK

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Command	Responses
Note: The application will format the mail header and send it during the data sending phase	
AT+WIPOPT=6,1,1,61 *Note: Get the sender address*	+WIPOPT: 6,61,"senderadress@mail.com" OK
AT+WIPOPT=6,1,1,60 *Note: Get last protocol error / status*	+WIPOPT:6,60,220,"220 innosoft.com SMTP service ready" OK
AT+WIPOPT=6,1,1,66 *Note: Get the set mail subject*	+WIPOPT: 6,66,"My mail subject" OK
AT+WIPOPT=7,1,1,72 *Note: Get total mail size*	+WIPOPT: 7,72,243000 OK
AT+WIPOPT=7,1,1,73 *Note: Get mail listing*	+WIPOPT: 7,73,"1,1024" +WIPOPT: 7,73,"2,5237" +WIPOPT: 7,73,"3,128" +WIPOPT: 7,73,"4,36400" +WIPOPT: 7,73,"5,356" OK
AT+WIPOPT=7,1,2,74,10 *Note: Delete mail ID 10*	+WIPOPT: 7,74,10 OK

5.3.7 Notes

It is possible to change and retrieve option value using +WIPOPT command only when the socket/session (given by <idx>) is active else it returns error.

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5.3.7.1 Options that can be applied to UDP, TCP Client, TCP Server Sockets

opt num	Value format	Option Type	Description	UDP	TCP client	TCP server
0	0-65535	WIP_COPT_PORT	Port of the socket	R	R	R
1	0-65535	WIP_COPT_PEER_PORT	Port of the peer socket	R	R	-
2	string	WIP_COPT_PEER_STRADDR	Address of the peer socket	R	R	-
3	0-1	WIP_COPT_BOUND	Specifies whether the socket is bounded[2] to a peer socket or not default: 1	R	-	-
4	1-5839	WIP_COPT_SND_LOWAT	Minimum amount of available space that must be available in the emission buffer before triggering a WIP_CEV_WRITE event default: 1024	-	RW	RW
6	0-65535	WIP_COPT_NREAD	Number of bytes that can currently be read on that socket default: 0	R	R	-
7	0-1	WIP_COPT_NODELAY	When set to TRUE, TCP packets are sent immediately, even if the buffer is not full enough. When set to FALSE, the packets will be sent either, a) by combining several small packets into a bigger packet b) when the data is ready to send and the stack is idle. default: 0	-	RW	RW

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opt num	Value format	Option Type	Description	UDP	TCP client	TCP server
8	0-255	WIP_COPT_TTL	Time-to-leave for packets default: 64	RW	RW	RW
9	0-255	WIP_COPT_TOS	Type of service default: 0	RW	RW	RW

[2] *The option WIP_COPT_BOUND is used to check whether an UDP socket is bound to any other UDP socket or not. When the UDP socket is created without specifying the IP address of the peer, then the option WIP_COPT_BOUND will be read as FALSE. This is because there is no destination IP address to communicate with. If the UDP socket is created by specifying the peer IP address, the option WIP_COPT_BOUND will be read as TRUE. This is because the peer IP address will be resolved by the DNS and the socket is said to be bounded to the peer socket. Hence this option will be read as TRUE.*

5.3.7.2 Options that can be applied to FTP Session

opt num	Value format	Value type	Description
40	0-1	boolean	data representation type. 0: ASCII 1: binary default: 0
41	0-1	boolean	FTP mode. 0: active 1: passive default: 1

5.3.7.3 Options that can be applied to HTTP Session

opt num	Value format	Value type	Option type	Description	Type
50		u32	WIP_COPT_RCV_BUFSIZE	set the size of the TCP socket receive buffer default: 0	RW

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opt num	Value format	Value type	Option type	Description	Type
51		u32	WIP_COPT_SND_BUFSIZE	set the size of the TCP socket send buffer. default: 0	RW
52	0-1	u8	WIP_COPT_HTTP_VERSION 0: HTTP 1.0 1: HTTP 1.1	define the HTTP version to be used by the session default: 1	RW
53		u32	WIP_COPT_HTTP_MAXREDIRECT	set the maximum number of allowed redirects a zero value disables automatic redirects default: 8	W
54		<ascii list>	WIP_COPT_HTTP_HEADER	return the HTTP message header field (or a list of message header fields) from the last WIPFILE call default: depends on the HTTP server	R

Caution: Option 54(WIP_COPT_HTTP_HEADER) is not implemented and hence attempt to read this option will result in +CME ERROR: 834.

5.3.7.4 Options that can be applied to SMTP Session

opt num	Value format	Value type	Option type	Description	Type
60	digit/string	u32/ascii	WIP_COPT_SMTP_STATUS_CODE	get last protocol error code and associated error string default: NULL string	R
61	string	ascii	WIP_COPT_SMTP_SENDER	set the sender address default: NULL string	RW
62	string	ascii	WIP_COPT_SMTP_SENDERNAME	set the sender name default: NULL string	RW
63	string	ascii	WIP_COPT_SMTP_REC	set the recipients list default: NULL string	RW
64	string	ascii	WIP_COPT_SMTP_CC_REC	set the CC recipients list default: NULL string	RW
65	string	ascii	WIP_COPT_SMTP_BCC_REC	set the BCC recipients list default: NULL string	RW
66	string	ascii	WIP_COPT_SMTP_SUBJ	set the mail subject default: NULL string	RW

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opt num	Value format	Value type	Option type	Description	Type
67	digit	u32	WIP_COPT_SMTP_FORMAT_HEADER	decide if the SMTP library will format the mail header or if the application is in charge of formatting it 0: Application formats mail header 1: SMTP lib formats mail header default: 1	RW

Caution: When option WIP_COPT_SMTP_FORMAT_HEADER is set to 0, application can format the mail header to attach documents (see RFC 2822 for Standard for the Format of ARPA Internet Text Messages for formatting details). Note that +WIPFILE command is used to send both mail header and body.
When option WIP_COPT_SMTP_STATUS_CODE is used to retrieve the error code and the associated error string for the SMTP session creation, it will not return any error code and error string if no error occurred during that particular SMTP session creation. For example, After the SMTP session is created successfully, an attempt to retrieve the error code and the associated error string, using the option WIP_COPT_SMTP_STATUS_CODE, will result in an error code "0" and the error string corresponding to the successful case. Create a SMTP session for the second time which will result in the "+CME ERROR: 840" error code because the session is already active. Now an attempt to retrieve the error code along with the associated error string, using the option WIP_COPT_SMTP_STATUS_CODE, will result in error code "0" and the associated error string because the first SMTP session was successful.

5.3.7.5 Options that can be applied to POP3 Session

opt num	Value format	Value type	Option type	Description	Type
70	digit/string	u32/ascii	WIP_COPT_POP3_STATUS_CODE	get last protocol error code and associated error string	R
71		u32	WIP_COPT_POP3_NB_MAILS	get total number of mails default: depends on the mails available in the mail box	R
72		u32	WIP_COPT_POP3_MAILSIZE	get total mail size default: depends on the mails available in the mail box	R

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opt num	Value format	Value type	Option type	Description	Type
73	digit/string	ascii	not a POP3 wip option	get mail listing The return value is a list of strings containing mail ID and mail size information. default: depends on the mails available in the mail box	R
74		u32	not a POP3 wip option	delete the mail ID The mail ID corresponds to the mail ID returned by the mail listing option. default: depends on the mails available in the mail box	W

Caution: When option WIP_COPT_POP3_STATUS_CODE is used to retrieve the error code and the associated error string for the POP3 session creation, it will not return any error code and error string if no error occurred during that particular POP3 session creation. For example, After the SMTP session is created successfully, an attempt to retrieve the error code and the associated error string, using the option WIP_COPT_POP3_STATUS_CODE, will result in an error code "0" and the error string corresponding to the successful case. Create a POP3 session for the second time which will result in the "+CME ERROR: 840" error code because the session is already active. Now an attempt to retrieve the error code along with the associated error string, using the option WIP_COPT_POP3_STATUS_CODE, will result in error code "0" and the associated error string because the first POP3 session was successful.

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6 Data Exchange for Protocol Services

The section deals with the data exchange for the services over TCP/IP. All the commands required for the data exchange through different services are mentioned in succeeding sections.

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6.1 File Exchange +WIPFILE

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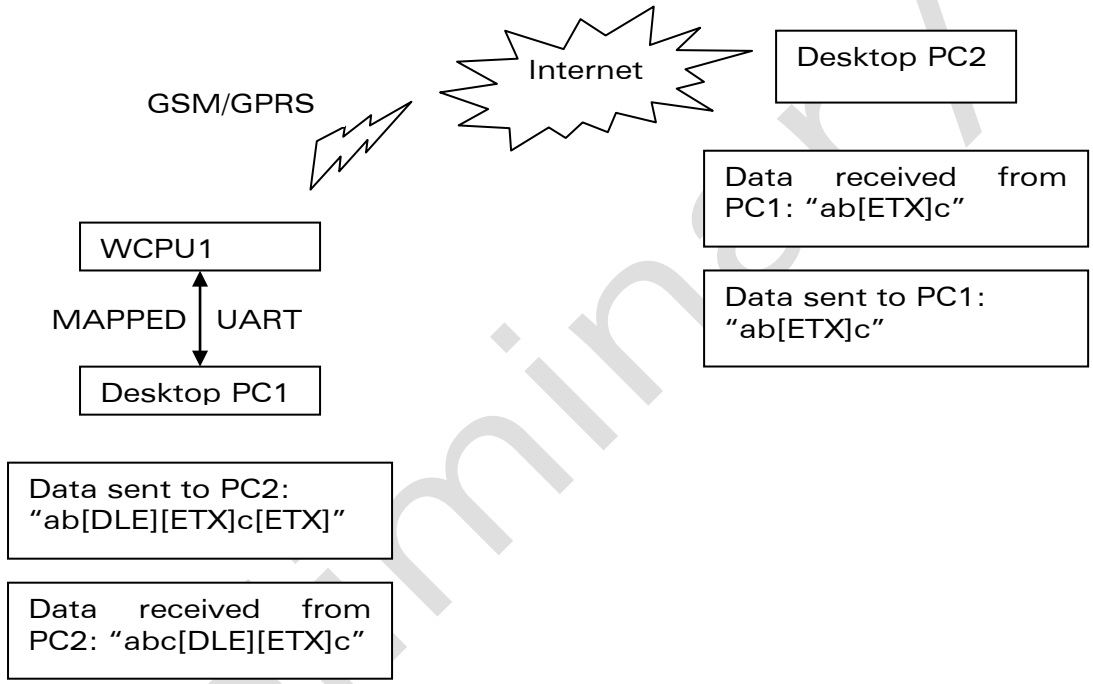
6.1.1 Description

The +WIPFILE command define the "file system" services that allow sending a block of data through standard TCP/IP protocols. This command is for file transfer/reception.

6.1.2 [ETX] Escaping Mechanism

In case an [ETX] character needs to be transmitted as data, it should be preceded by [DLE] character. A single [ETX] character marks the end of transmission. Similarly, [ETX] characters received from the internet are sent to the host through the serial port preceded by a [DLE] character.



The above schematic explains how [ETX] characters which have a special meaning in WIP soft are handled on Wavecom Wireless CPU®.
On transmitting side, when [ETX] characters are escaped by a DLE (use case: Desktop PC1 sends data to the Wireless CPU®. Data contains an [ETX] character escaped by a [DLE] character ([DLE] [ETX] sequence), then the [ETX] character is transmitted as data.

On the receiving side, when [ETX] character is received as data (use case: The PC2 sends data to the Wireless CPU®. Data contains an [ETX] character), then the [ETX] character will be preceded by a [DLE] character when it is sent to host through the serial port.

6.1.3 [DLE] Escaping Mechanism

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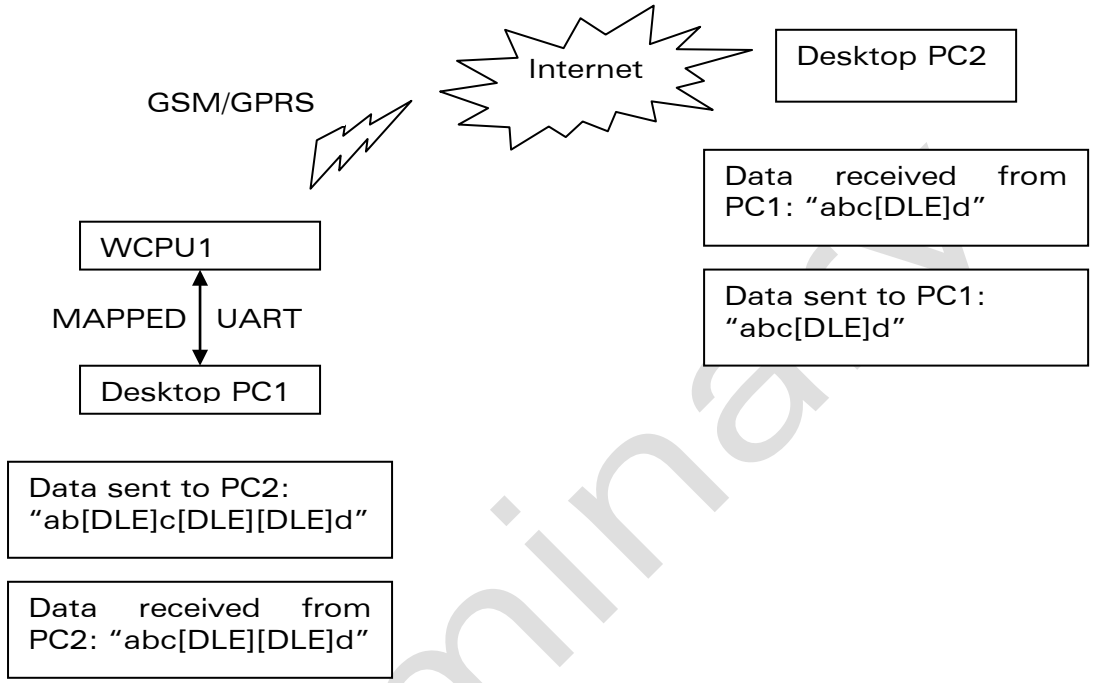
In case a [DLE] character needs to be transmitted as data, it should be preceded by another [DLE] character. A single [DLE] character, not preceded by a [DLE] character will not be transmitted. Similarly, [DLE] characters received are sent to the host through the serial port preceded by a [DLE] character.



The above schematic explains how [DLE] characters which have a special meaning in WIP soft are handled on Wavecom Wireless CPU®.
On the transmitting side, when [DLE] characters are escaped by another [DLE] character (use case: Desktop PC1 sends data to the Wireless CPU®. Data contains a non escaped [DLE] character, and another escaped [DLE] character ([DLE][DLE] sequence), then the [DLE] character is transmitted as data. A single [DLE] character is ignored and not transmitted.

On the receiving side, when [DLE] character is received as data (use case: The PC2 sends data to the Wireless CPU®. Data contains an [DLE] character), then the [DLE] character will be preceded by another [DLE] character when it is sent to host through the serial port.

6.1.4 Syntax

- if <protocol>=4

Action Command

AT+WIPFILE=<protocol>,<index>,<mode>,<filename>

CONNECT

...

OK

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- if <protocol>=5

Action Command
AT+WIPFILE=<protocol>,<index>,<mode>,<filename>[,<username>, <password>][,<headers list>[…]]
CONNECT
...
OK

Preliminary

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- if <protocol>=6

Action Command

AT+WIPFILE=<protocol>,<index>,<mode>

CONNECT

...

OK

- if <protocol>=7

Action Command

AT+WIPFILE=<protocol>,<index>,<mode>,<filename>

CONNECT

...

OK

- if <protocol>=5

Unsolicited response

+WIPFILE: 5,<index>,<mode>,<http status code>,<http status reason>

Read command

AT+WIPFILE?

OK

Test Command

AT+WIPFILE=?

OK

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6.1.5 Parameters and Defined Values

<protocol>:		protocol type
	4	FTP
	5	HTTP
	6	SMTP
	7	POP3
<idx>:		channel identifier
<mode>:		file transfer mode
	1	This command switches the UART to data mode and prints the content of the file on UART. The end of the file is marked by [ETX] character and UART switches back to AT mode. This mode is used for downloading file from the FTP server if <protocol>=4. This mode is used for downloading data of the specified URL using HTTP GET method if <protocol>=5. This mode is used for retrieving mail without deleting it from the POP3 server if <protocol>=7. This mode is not supported by SMTP protocol.
	2	This command switches the UART to data mode and accepts a stream of data terminated by [ETX] character. This mode is used for uploading file to the FTP server if <protocol>=4. This mode is used for uploading data to the specified URL using HTTP PUT method if <protocol>=5. This mode is used for sending mail to the SMTP server if <protocol>=6. This mode is not supported by POP3 protocol.
	3	This mode is used for deleting the specified URL using HTTP DELETE method if <protocol>=5. This mode is used for retrieving mail and deletion after retrieval from the POP3 server if <protocol>=7. This mode is not supported by FTP and SMTP protocol.

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	4	This command switches the UART in data mode and accepts a stream of data terminated by [ETX] character. This mode is used for uploading data to the HTTP server using HTTP POST method if <protocol>=5. This mode is not supported by FTP, SMTP and POP3 protocol.
<filename>:		file name if <protocol>=4: specify the name of the file to upload or download The maximum file length is limited to 128 characters. The actual filename, including path name has to be used. if <protocol>=5: URL of the HTTP request if <protocol>=7: mail id in string format
<user name>:		user name in string format
<password>:		Password in string format
<header list>:		HTTP header message (name-value pair) The first string in the message header field is the name of the header and the second string is the value of the header.
<...>		additional HTTP message header fields more pairs(name, value) of HTTP message header field can be added
<http status code>:		HTTP 3 digit status code of the response
<http status reason>:		HTTP status reason of the response in string format

6.1.6 Parameter Storage

None

6.1.7 Possible Errors

"+CMEE" AT error code	Description
800	invalid option
803	operation not allowed in the current WIP stack state
830	bad index
831	bad state
834	not implemented
836	memory allocation error

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"+CMEE" AT error code	Description
837	bad protocol
839	error during channel creation
846	internal error: FCM subscription failure
860	protocol undefined or internal error
867	POP3 email retrieving error
868	POP3 email size error
880	SMTP sender email address rejected by server
881	SMTP recipient email address rejected by server
882	SMTP CC recipient email address rejected by server
883	SMTP BCC recipient email address rejected by server
884	SMTP email body send request rejected by server

6.1.8 Examples

Command	Responses
AT+WIPFILE=4,1,1,"data.bin" *Note: Retrieve the data for the given filename with index 1*	CONNECT <data received terminated by [ETX] character> OK
AT+WIPFILE=4,1,2,"report.log" *Note: Send data to the given filename*	CONNECT <data terminated by [ETX] character> OK
AT+WIPFILE=5,1,1,"urlForGet","username","password","Accept","text/html" *Note: Send a HTTP GET request to URL*	CONNECT <data received terminated by [ETX] character> OK +WIPFILE:5,1,1,<http status>,<http status reason> *Note: HTTP GET of specified url* *1 header message:* *Header field name is "Accept"* *Header field value is "text/html"*

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Command	Responses
AT+WIPFILE=5,1,1,"urlForGet","username","password","Accept","text/html","Tansfer-Codings","compress" *Note: Send a HTTP GET request to URL*	CONNECT <data received terminated by [ETX] character> OK +WIPFILE:5,1,1,<http status>,<http status reason> *Note: HTTP GET of specified url* *2 header messages:* *Header field name is "Accept"* *Header field value is "text/html"* *Header field name is "Transfer-Codings"* *Header field value is "compress"*
AT+WIPFILE=5,1,2,"urlForPut" *Note: Send a HTTP PUT request to URL*	CONNECT <data terminated by [ETX] character> OK +WIPFILE:5,1,2,<http status code>,<http status reason>
AT+WIPFILE=5,1,3,"urlForDelete" *Note: Send a HTTP DELETE request to URL*	CONNECT <data received terminated by [ETX] character> OK +WIPFILE:5,1,3,<http status code>,<http status reason>
AT+WIPFILE=5,1,4,"urlForPost"	CONNECT <data received terminated by [ETX] character> OK +WIPFILE:5,1,4,<http status code>,<http status reason>

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Command	Responses
Note: Send a HTTP POST request to URL	
AT+WIPFILE=6,1,2 *Note: Send data mail content*	CONNECT <data sent terminated by [ETX] character> OK
AT+WIPFILE=7,1,1,"15" *Note: Retrieve data from the given ID*	CONNECT <data received terminated by [ETX] character > OK *Note: Retrieve mail ID 15* *Mail is not deleted after retrieval*
AT+WIPFILE=7,1,3,"1" *Note: Retrieve data from the given ID*	CONNECT <data received terminated by [ETX] character > OK *Note: Retrieve mail ID 1 and delete it after retrieval*

6.1.9 Notes

The [ETX] character is considered as an end of data. Hence, in case [ETX] character needs to be transmitted, it should be preceded by [DLE] character.

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6.2 Socket Data exchange +WIPDATA

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6.2.1 Description

The +WIPDATA command is used to read/write from/to a socket. On successful execution of the command, the UART switches to data mode. The UART can be switched back to AT mode by sending "+++" with 1 second guard time before and after the sequence. If data is not read using +WIPDATA command, further data will be delayed.
An unsolicited event is received when there is a data to read on socket.

Data can be sent on the sockets using two modes

- continuous mode
- continuous transparent mode

6.2.2 Continuous Mode

6.2.2.1 TCP Sockets in Continuous mode

In continuous mode, an [ETX] character is considered as an end of data. When an [ETX] character is sent on the mapped UART, the TCP socket is shutdown and the peer side is informed of this shutdown with the indication "[CR][LF]SHUTDOWN[CR][LF]" on the mapped UART.
In case an [ETX]/[DLE] character needs to be transmitted as data, it should be preceded by [DLE] character. Similarly, [ETX]/[DLE] characters received by the TCP/IP stack from the internet are sent to the host through the serial port preceded by a [DLE] character.
To close sockets, switch the UART to AT command mode and use +WIPCLOSE command.

6.2.2.2 UDP Sockets in Continuous mode

UDP is a connectionless protocol and hence there is no way to detect or cause a shutdown. However, an [ETX] character is used to mark the boundaries of datagrams.

All data written on an UDP socket is collected till an [ETX] character is encountered or the maximum size of the datagram[1] is reached and will be sent as a single datagram. Similarly when reading data, all data will be read till an [ETX] character is encountered which indicates the end of the datagram. Note that, in this mode, packet segmentation feature is not supported.

In case an [ETX]/[DLE] character needs to be transmitted, it should be preceded by [DLE] character similar to TCP socket.

[1] *Maximum size of an UDP datagram has been fixed to 5904 Bytes. This limit is an arbitrary one. Nevertheless, note that smaller the datagram is the surer it will reach the aimed destination. Note that UDP is not a reliable transport layer.*

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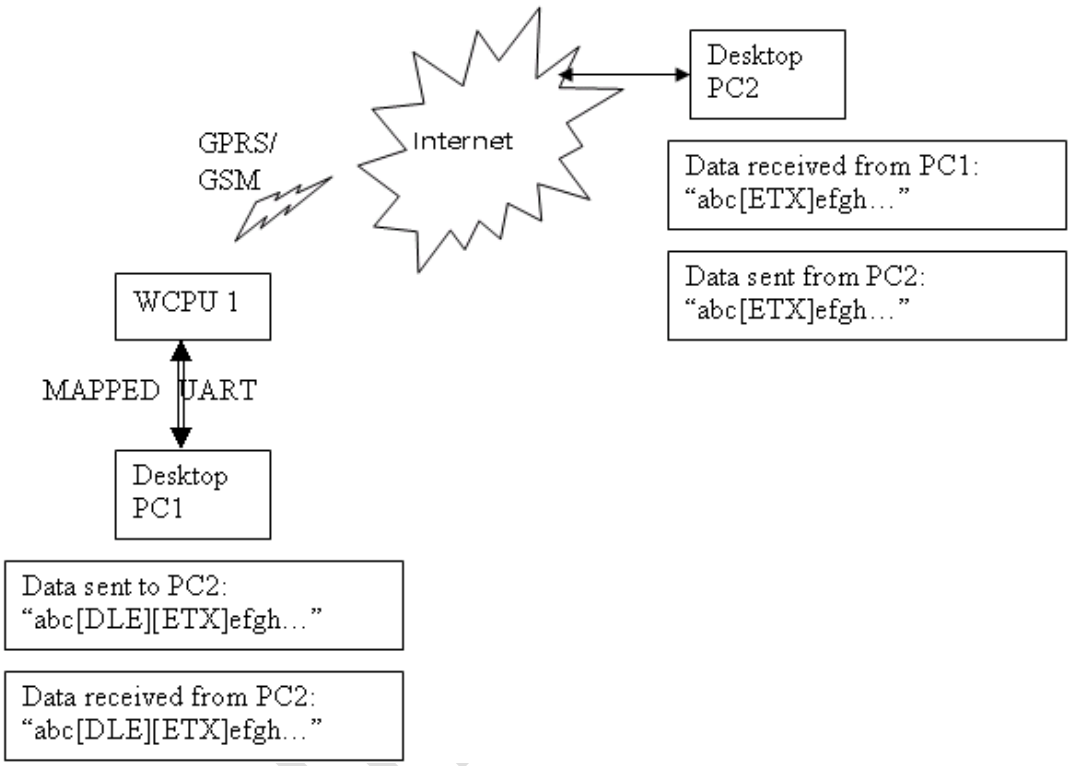
When the UART leaves DATA mode, either because of "+++" escape sequence or because of an AT+WIPDATA=1, index, 0 on another UART, the currently unsent data are sent as a single datagram.

6.2.2.3 [ETX] Escaping Mechanism



The above schematic explains how [ETX] characters – which have a special meaning in WIP soft – are handled on Wavecom Wireless CPU®.
On transmitting side, when [ETX] are not escaped (use case: Desktop PC1 sends data towards Wireless CPU®. Data contain a non escaped [ETX] (⇔ no [DLE][ETX] sequence), then [ETX] is not transmitted but an action is done on Wireless CPU® regarding the concerned socket:

- UDP socket: a non escaped [ETX] marks the boundary of the current datagram to be sent. Datagram is immediately sent and the [ETX] is not sent towards the desktop PC2.
- TCP socket: a non escaped [ETX] causes a TCP shutdown operation on the transmitting direction: peer is informed that Wireless CPU® will not send any more data on that socket. Usually, peer will shutdown the other way (downlink) and this will result in a "peer close event" on the socket.

On receiving side, when [ETX] are not escaped (use case: Wireless CPU® sends data towards Desktop PC1. Data contain a non escaped [ETX] (⇔ no [DLE][ETX] sequence), then [ETX] means that a special "IP" event occurred on Wireless CPU® regarding the concerned socket:

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- UDP socket: a non escaped [ETX] signals the boundary of the current received datagram.
- TCP socket: a non escaped [ETX] signals that the peer TCP connected TCP unit shutdown the downlink way. Desktop PC1 should then close the uplink socket to totally terminate the TCP "session".

Protocol	Mapped UART	IP Network (active socket)
UDP	Data containing [DLE][ETX] sequence.	Data containing [ETX].
UDP	[ETX] alone.	Mark the boundary of the UDP Datagram received/to be transmitted.
TCP	Data containing [DLE][ETX] sequence.	Data containing [ETX].
TCP	[ETX] alone.	Causes/signals a shutdown operation on TCP socket.

Note that the behaviour is symmetrical: apply both on transmitting/receiving side of mapped UART.

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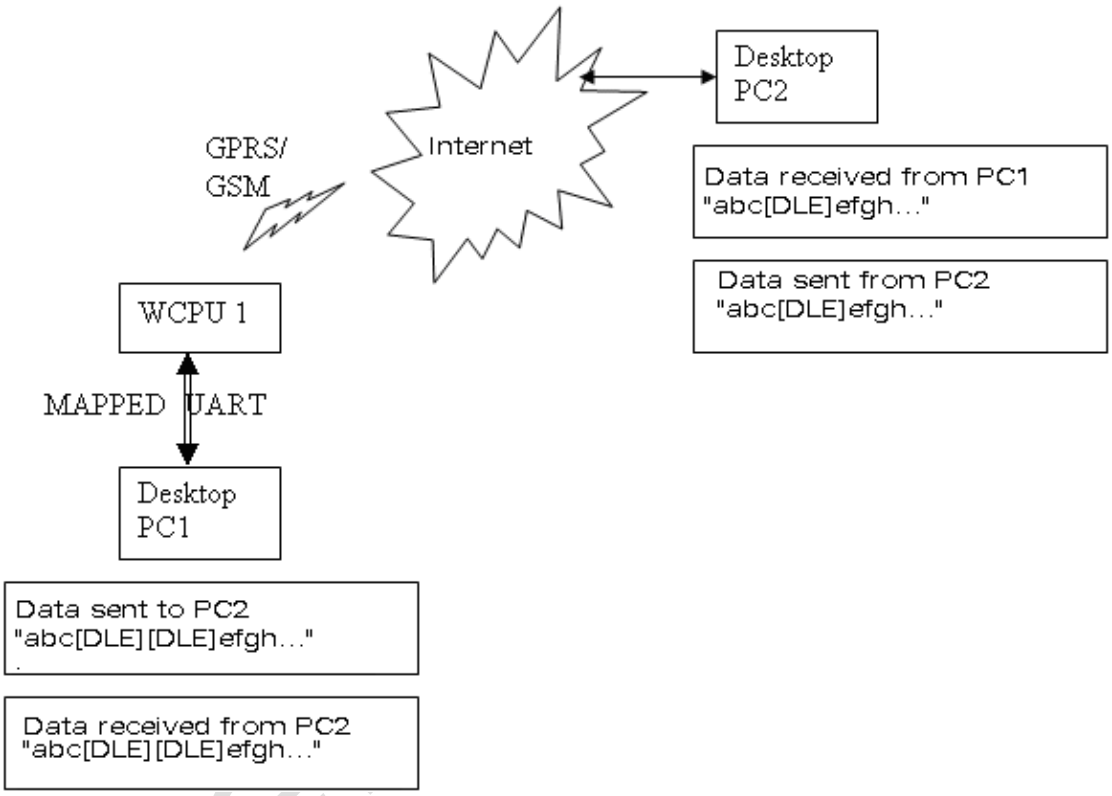
6.2.2.4 [DLE] Escaping Mechanism

A [DLE] character will be sent as data only when it is preceded by another [DLE] character. A single [DLE] character which is not preceded by a [DLE] character will not be transmitted.



The above schematic explains how [DLE] characters – which have a special meaning in WIPSoft – are handled on Wavecom Wireless CPU®.

On transmitting side, when [DLE] is not escaped (use case: Desktop PC1 sends data towards Wireless CPU®. Data contains a non escaped [DLE] (⇔ no [DLE][DLE] sequence), then [DLE] is not transmitted.

On transmitting side, when [DLE] is escaped (use case: Desktop PC1 sends data towards Wireless CPU®. Data contain an escaped [DLE] (⇔ [DLE][DLE] sequence) then [DLE] data is transmitted.

On the receiving side (use case: when Desktop PC2 sends data towards Wireless CPU®. Data contains a no escaped [DLE]) the data sent from the Wireless CPU® to Desktop PC1 will contain an escaped [DLE] preceding the [DLE] character (Desktop PC1 receives [DLE][DLE] character from Wireless CPU®).

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The scenario is same for both TCP and UDP sockets.

Protocol	Mapped UART	IP Network (active socket)
UDP	Data containing [DLE][DLE] sequence.	Data containing [DLE].
UDP	[DLE] alone.	A single [DLE] is ignored.
TCP	Data containing [DLE][DLE] sequence.	Data containing [DLE].
TCP	[DLE] alone.	A single [DLE] is ignored.

6.2.3 Continuous Transparent Mode

6.2.3.1 TCP Sockets in Continuous Transparent Mode

In this mode there is no special meaning associated for [DLE]/[ETX] characters. They are considered as normal data and all the data will be transmitted on the mapped UART.

6.2.3.2 UDP Sockets in Continuous Transparent Mode

In this mode there is no special meaning associated for [DLE]/[ETX] characters. They are considered as normal data and all the data will be transmitted on the mapped UART. In case [ETX]/[DLE] character is received, it will not be preceded by a [DLE] character before sending it to the mapped UART.

6.2.4 Leaving Continuous /Continuous Transparent Mode

The UART can be switched back to AT mode

- by sending "+++" with 1 second guard time before and after the sequence
- by sending an AT+WIPDATA=<proto.,<index>,0 on another UART in AT mode

When the UART leaves data mode either because of "+++" escape sequence or because of an unmapping done on another UART, the currently unsent data are sent as a single datagram.

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6.2.5 Resetting TCP Sockets

A TCP socket is reset when the connection is aborted due to an error on the socket. When the socket is reset, an [ETX] character is sent on the mapped UART to indicate the end of communication. The mapped UART switches to AT mode and "+CME ERROR: 843" is displayed on the UART.

6.2.6 Syntax

Action Command

AT+WIPDATA=<protocol>,<idx>,<mode>[,<send size>,<wait time>]

CONNECT

Read Command

AT+WIPDATA?

NONE

Test Command

AT+WIPDATA=?

OK

- if <protocol>=1

Unsolicited response

+WIPDATA: <protocol>,<idx>,<datagram size>,<peer IP>,<peer port>

Caution: Using +WIP AT commands, when receiving several UDP datagrams on an IP bearer, +WIPDATA indication is sent once for the first received datagram. Next indication (for next remaining UDP datagram to read) is sent once the first datagram have been read (using +WIPDATA command).

- if <protocol>=2

Unsolicited response

+WIPDATA: <protocol>,<idx>,<number of readable bytes>

Caution: The value returned by <number of readable bytes> indicates that there is some TCP data ready to be read but number of bytes returned might not be reliable.

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6.2.7 Parameters and Defined Values

<protocol>:		socket type
	1	UDP
	2	TCP client
<idx>:		socket identifier
<mode>:		mode of operation
	0	unmap: switch the UART (mapped to continuous mode) to AT mode.
	1	continuous: switch the UART to data mode.
	2	continuous transparent: switch the UART to data mode. In this mode,[DLE]/[ETX] characters are considered as normal data and not special characters.
<send size>:		data packet size: This parameter specifies the size of the data packet that needs to be sent to the peer. This parameter is supported only for UDP continuous transparent mode. range: 8-1460 (default value: 1020)
<wait time>:		timeout for configuring the packet segmentation on IP network side: This parameter specifies the timeout after which the buffered data will be sent to the peer irrespective of size of the data packet. This parameter is supported only for UDP continuous transparent mode. range: 1-100 (default value: 2)

6.2.8 Parameter Storage

None

6.2.9 Possible Errors

"+CMEE" AT error code	Description
831	bad state
837	bad protocol
843	connection reset by peer

6.2.10 Examples

Command	Responses

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Command	Responses
AT+WIPDATA=2,5,1 *Note; TCP Client with index 5 can send/read data in continuous mode*	CONNECT <read/write data> +++ OK *Note; +++ sequence causes the UART to switch to AT mode*
AT+WIPDATA=2,5,1,10,5	CONNECT <read/write data> +++ OK
Note; TCP Client with index 5 can send/read data in continuous mode	*Note; +++ sequence causes the UART to switch to AT mode*
AT+WIPDATA=1,5,1 *Note; UDP with index 5 can send/read data in continuous mode*	CONNECT <read/write data> +++ OK *Note; +++ sequence causes the UART to switch to AT mode*
AT+WIPDATA=1,5,1 *Note; UDP with index 5 can send/read data in continuous mode*	CONNECT <read/write data> <ETX> OK *Note; [ETX] character indicates end of data*
AT+WIPDATA=1,5,2	CONNECT <read/write data> +++ OK
Note; UDP with index 5 can send/read data in continuous transparent mode with default value set for <send size> and <wait time>	*Note; +++ sequence causes the UART to switch to AT mode*
AT+WIPDATA=1,5,2,20,2	CONNECT <read/write data> +++ OK
Note; UDP with index 5 can send/read data in continuous transparent mode with <send size> set to 20 and <wait time> set to 2	*Note; +++ sequence causes the UART to switch to AT mode*
AT+WIPDATA=2,5,1,20,10	CONNECT <read/write data> +++ OK

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Command	Responses
Note: TCP with index 5 can send/read data in continuous mode with <send size> set to 20 and <wait time> set to 10	*Note; +++ sequence causes the UART to switch to AT mode*
AT+WIPDATA=2,5,2,10,5	CONNECT <read/write data> +++ OK
Note: TCP with index 5 can send/read data in continuous transparent mode with <send size> set to 10 and <wait time> set to 5	*Note; +++ sequence causes the UART to switch to AT mode*
AT+WIPDATA=2,5,2 *Note: TCP with index 5 can send/read data in continuous transparent mode*	CONNECT <read/write data> +++ OK *Note; +++ sequence causes the UART to switch to AT mode*

6.2.11 Notes

6.2.11.1 Continuous Mode (Non Transparent) for a TCP Mapped Socket

If the [ETX] character is sent from the peer, it is considered as an end of data transfer. After sending an [ETX] character, the socket will be shutdown and the peer will be informed of this shutdown by a "[CR][LF]SHUTDOWN[CR][LF]" indication on its mapped UART and the UART does not switch to AT mode. This indicates that no more data can be sent from the host socket, but it can receive data. The below schematic shows the shutdown procedure for a TCP socket:

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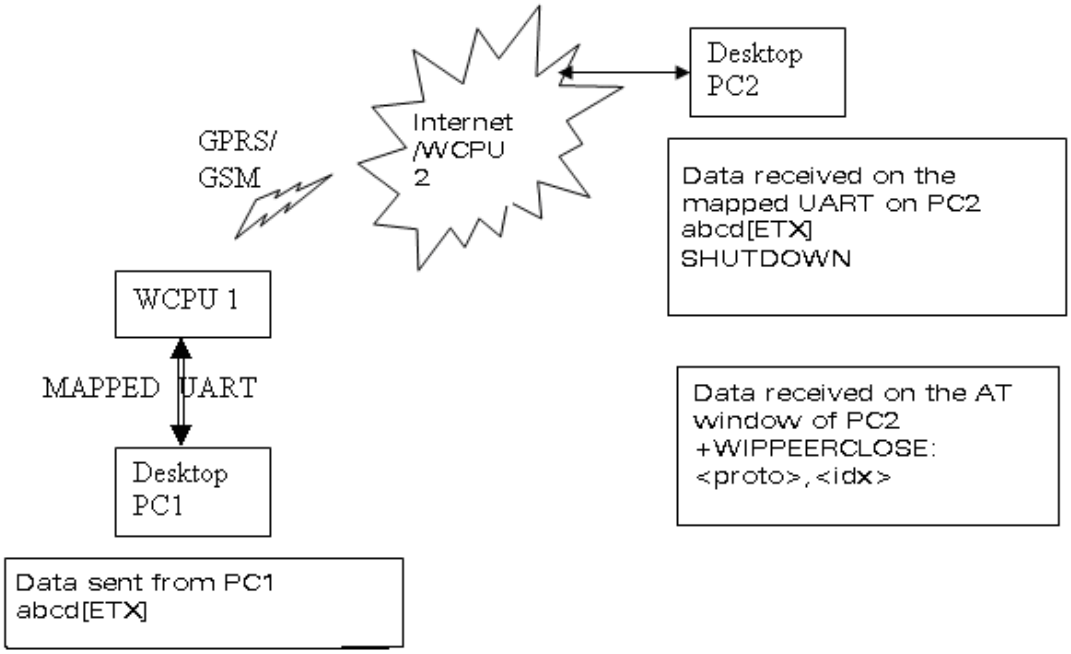

In the above schematic, a TCP socket is connected. On the transmitting side, data and [ETX] is sent (use case: Desktop PC1 is a Wireless CPU® which sends data to PC2 which is either a PC or a Wireless CPU®), the data is received on PC2 and [ETX] character shutdowns the socket on the transmitting side and displays a message "[CR][LF]SHUTDOWN[CR][LF]" on the mapped UART of PC2.

When PC2 is switched back to AT mode, "+WIPPEERCLOSE: <protocol>,<idx>" indication is received indicating that no more data can be sent by PC1 but can read data sent from PC2.

There are different indications received for shutdown and reset for a TCP socket. When a TCP socket is reset, [ETX] character is sent on the mapped UART to indicate the end of communication. The mapped UART switches to AT mode and "+CME ERROR: 843" is displayed on the UART. The reset and shutdown can therefore be distinguished by the indications received on the UART.

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6.2.11.2 Mapping/Unmapping of a Mapped UDP and TCP Socket

When a TCP socket is unmapped and still active, it is possible to map it again in another mode which is different from the previous one without closing the TCP socket.

The UART switches back to AT mode due to "+++"with 1 second guard time before and after the sequence or by sending an AT+WIPDATA=<proto>,<index>,0 on another UART in AT mode. This applies to both UDP and TCP protocols.

When +++ is issued, Wireless CPU® switches from DATA mode to AT mode. If ATO command is used to switch the Wireless CPU® back to DATA mode,

- +CME ERROR:3 will be received when GPRS bearer is used
- no response is received when GSM bearer is used

To switch the Wireless CPU® back to DATA mode, AT+WIPDATA=x,x,x should be used instead of ATO. After executing AT+WIPDATA=x,x,x command, "CONNECT" will be received to indicate that the Wireless CPU® is switched back to DATA mode.

Note that un-mapping socket using +WIPDATA command with <send size> and <wait time> specified results in "ERROR".

6.2.11.3 Time out Mechanism to know the state of the Peer TCP Socket

In a TCP server-client connection between two remote devices if the peer socket is closed down abruptly (e.g. powered off) the peer TCP socket does not get any indication message. This is a normal behavior. The TCP protocol uses a timeout mechanism to check the state of the TCP sockets in a TCP socket connection. According to this mechanism, to know the state of the peer TCP socket the data needs to be sent and wait for the acknowledgement within a specified time period. If the acknowledgement is not received within the specified time out period then the data is retransmitted. But if the time out occurs before receiving acknowledgement then it implies that the peer TCP socket is closed.

TCP Timeout Period = function (R, N)
Where,

R = Round trip time. This is the time for a TCP packet to go to the remote TCP socket and the time to receive the acknowledgement by the transmitter TCP socket. The typical round trip time is 1 seconds for GPRS.

N = Number of retransmission allowed before the time out happens.

Hence, the typical timeout period is 10 minutes depending on the network and also the peer TCP socket localization.
In WIP Soft, to know the state of the peer socket, data needs to be sent. If acknowledgement is not received within the timeout period then "+CME ERROR: 842" is returned. This indicates that the peer socket is closed.

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Please note that the retransmission of the data to the peer TCP socket within the timeout period is managed by the Open AT Plug-in WIP Lib.

6.2.11.4 Packet Segmentation in TCP Socket

The parameters used for packet segmentation can be configured using +WIPDATA or +WIPCFG command. In case if it is not configured using +WIPDATA command, then the values already set for option WIP_NET_OPT_TCP_MIN_MSS and AT_WIP_NET_OPT_PREF_TIMEOUT_VALUE will be used.

Note that if an attempt is made to set data packet size more than twice the value of WIP_NET_OPT_TCP_MIN_MSS using +WIPDATA command results in "+CME ERROR: 847".

The data sent to a mapped TCP socket through UART will be buffered before sending it to the peer. This buffered data will be sent to the peer when:

- total amount of buffered data is twice or more than the preferred segmentation size. The preferred segmentation size is configurable through the "AT+WIPCFG = 2, 4, <size>" (WIP_NET_OPT_TCP_MIN_MSS) or +WIPDATA command.
- internal timer expires. The timeout period is configurable through the "AT+WIPCFG = 2,12,<time>" (AT_WIP_NET_OPT_PREF_TIMEOUT_VALUE) or +WIPDATA command.
- socket is unmapped, shut down or closed

In some scenarios, there might be a segmentation of data packets because of timer expiration, network problems etc. Thus a single packet of data may be received in more than one packet at the peer

6.2.11.5 Packet Segmentation in UDP Socket

This feature for UDP is supported only in case of continuous transparent mode. If the +WIPDATA command is executed in continuous mode to use this feature, "ERROR" will be returned. The parameters used for packet segmentation can be configured using +WIPDATA command. In case if it is not configured using +WIPDATA command, default value of these parameters will be used.

The data sent to a mapped UDP socket through UART will be buffered before sending it to the peer. This buffered data will be sent to the peer when:

- the buffered data size is equal to segmentation size. Note that if the buffered data is greater than segmentation size, then the data will be written to the channel in chunks of segmentation size.
- the timer expires
- socket is unmapped or closed

In some scenarios, there might be a segmentation of data packets because of timer expiration, network problems etc. Thus a single packet of data may be received in more than one packet at the peer.

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7 Ping Services

7.1 PING command+WIPPING

7.1.1 Description

The +WIPPING command is used to configure different PING parameters and to send PING requests. An unsolicited response is displayed each time a "PING" echo event is received or a timeout expires.

7.1.2 Syntax

Action Command

AT+WIPPING=<host>,[<repeat>,<interval>,[<timeout>,[<nwrite>,[<ttl>]]]]

OK

Read Command

AT+WIPPING?

OK

Test Command

AT+WIPPING=?

OK

Unsolicited response

+WIPPING:<timeout_expired>,<packet_idx>,<response_time>

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7.1.3 Parameters and Defined Values

<host>:	host name or IP address string
<repeat>:	number of packets to send range: 1-65535 (default value:1)
<interval>:	number of milliseconds between packets range: 1-65535 (default value:2000)
<timeout>:	number of milliseconds before a packet is considered lost range: 1-65535 (default value:2000)
<ttl>:	IP packet Time To Live. Default value is set by WIP_NET_OPT_IP_TTL +WIPCFG option range : 0-255
<nwrite>:	size of packets range : 1-1500 (default value:64)
<timeout_expired>:	PING result 0: PING response received before <timeout> 1: <timeout> expired before the response was received
<packet_idx>:	packet index in the sequence
<response_time>:	PING response time in millisecond

7.1.4 Parameter Storage

None

7.1.5 Possible Errors

"+CMEE" AT error code	Description
800	invalid option
801	invalid option value
819	error on ping channel

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7.1.6 Examples

Command	Responses
AT+WIPPING="www.wavecom.com" *Note: Ping "www.wavecom.com"*	OK +WIPPING: 1,0,0 *Note: Ping "www.wavecom.com failed : timeout expired*
AT+WIPPING="192.168.0.1" *Note: Ping "192.168.0.1"*	OK +WIPPING: 0,0,224 *Note: Ping "192.168.0.1 succeeded. Ping response received in 224 ms*
AT+WIPPING="192.168.0.1",2,2000,1000 *Note: Send 2 successive ping requests to "192.168.0.1". Each Ping is every 2000 ms, timeout is set to 1000 ms (if ping responses time is more than 1000 ms then timeout expires)*	OK +WIPPING: 0,0,880 +WIPPING: 1,1,xxxx *Note: Ping "192.168.0.1 succeeded. First Ping response received in 880 ms. Second one was not received before specified timeout (1000 ms) ⇔ timeout expired*

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8 WIPSoft Library API

The WIPSoft Application provides a comprehensive and flexible environment to use the IP feature using AT commands. The WIPSoft Application is an Open AT® Application and it uses the Open AT® Plug-in WIP Lib as the TCP/IP protocol stack. Hence when the WIPSoft application executed no other Open AT® Application can be executed in the Wireless CPU®. WIPSoft API allow customer application to subscribe for AT+WIP commands

Customer application can subscribe to AT+WIP commands using WIP Soft library API. This feature allows customer application to use ADL services with WIPSoft services. Note that concurrent access to IP stack from WIPSoft library and WIP library results in unpredictable events and behavior. Hence it is recommended to us either WIPSoft library API or WIP library at a time but not both at the same time.

The FCM flow, through which the WIP AT commands are executed, is subscribed by the WIPSoft library to transfer data between the Wireless CPU® and the external device. Hence, if the WIPSoft library is subscribed from the Open AT® Application, same FCM flow should not be subscribed from the same Open AT® Application.

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8.1 Required Header File

The header file for the WIP AT command interface is wip_atcmd.h.

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8.2 The wip_ATCmdSubscribe Function

The wip_ATCmdSubscribe function subsribes to +WIPCFG, +WIPBR, +WIPPING, +WIPCREATE, +WIPDATA, +WIPFILE, +WIPOPT AT commands provided by WIPSoft.

8.2.1 Prototype

```
s32 wip_ATCmdSubscribe ( void );
```

8.2.2 Parameters

None

8.2.3 Returned Values

The function returns

- 0 on success
- negative error code on failure as described below:

Error Code	Description
-1	subscription for WIP AT commands fails
-2	WIP AT commands already subscribed

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8.3 The wip_ATCmdUnsubscribe Function

The wip_ATCmdUnsubscribe function unsubscribes to +WIPCFG, +WIPBR, +WIPPING, +WIPCREATE, +WIPDATA, +WIPFILE, +WIPOPT AT commands provided by WIPSoft.

8.3.1 Prototype

```
s32 wip_ATCmdUnsubscribe ( void );
```

8.3.2 Parameters

None

8.3.3 Returned Values

The function returns

- 0 on success
- negative error code on failure as described below:

Error Code	Description
-3	WIP AT commands already unsubscribed
-4	un-subscription for WIP AT commands fails

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9 Examples of Application

9.1 TCP Socket

9.1.1 TCP Server Socket

9.1.1.1 Using GPRS bearer

AT+WIPCFG=1	*//start IP stack*
OK	
AT+WIPBR=1,6	*//open GPRS bearer*
OK	
AT+WIPBR=2,6,11,"APN name"	*//set APN name of GPRS bearer*
OK	
AT+WIPBR=2,6,0,"user name"	*//set user name (<login>)*
OK	
AT+WIPBR=2,6,1,"passwd"	*//set password (<password>)*
OK	
AT+WIPBR=4,6,0	*//start GPRS bearer*
OK	
AT+WIPCREATE=3,1,80,5,8	*//create the server on port 80, idx = 1. The server //is listening for connection request on port //80.Spawned sockets will be given the index 5, //6, 7 and 8. It will accept connection request //until it has no more socket left.*
OK	
+WIPACCEPT: 1,5	*//unsolicited: the server accepted a connection //resulting TCP client on idx 5.*
AT+WIPDATA=2,5,1	*//exchange data on socket index 5*
CONNECT	
…	*//read, write*
+++	*//switch to AT mode*
OK	
AT+WIPCLOSE=2,5	*//close the TCP client socket index 5*
OK	

9.1.1.2 Using GSM bearer

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AT+WIPCFG=1	*//start IP stack*
OK	
AT+WIPBR=1,5	*//open GSM bearer*
OK	
AT+WIPBR=2,5,2,"Phone number"	*//set phone number for GSM bearer*
OK	
AT+WIPBR=2,5,0,"user name"	*//set user name*
OK	
AT+WIPBR=2,5,1,"passwd"	*//set password*
OK	
AT+WIPBR=4,5,0	*//start GSM bearer*
OK	
AT+WIPCREATE=3,1,80,5,8	*//create the server on port 80, idx = 1. The server //is listening for connection request on port //80.Spawned sockets will be given the index 5, //6, 7 and 8. It will accept connection request //until it has no more socket left.*
OK	
+WIPACCEPT: 1,5	*//unsolicited: the server accepted a connection //resulting TCP client on idx 5*
AT+WIPDATA=2,5,1	*//exchange data on socket idx 5*
CONNECT	
…	*//read, write*
+++	*//switch to AT mode*
OK	
AT+WIPCLOSE=2,5	*//close the TCP client socket index 5*
OK	

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9.1.2 TCP Client Socket

9.1.2.1 Using GPRS Bearer

AT+WIPCFG=1	*//start IP stack*
OK	
AT+WIPBR=1,6	*//open GPRS bearer*
OK	
AT+WIPBR=2,6,11,"APN name"	*//set APN name of GPRS bearer*
OK	
AT+WIPBR=2,6,0,"user name"	*//set user name*
OK	
AT+WIPBR=2,6,1,"passwd"	*//set password*
OK	
AT+WIPBR=4,6,0	*//start GPRS bearer*
OK	
AT+WIPCREATE=2,1,"ip addr",80	*//create a TCP client towards peer IP device @ "ip //addr", port 80.*
OK	*//all parameters and iP stack behavior are OK.*
+WIPREADY: 2,1	*//unsolicited: the TCP client socket is connected //to the peer*
AT+WIPDATA=2,1,1	*//exchange data on socket idx 1:*
CONNECT	
…	*//read, write*
+++	*//switch to AT mode*
OK	
AT+WIPCLOSE=2,1	*//close the TCP client socket index 1*
OK	

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9.1.2.2 Using GSM Bearer

```
AT+WIPCFG=1                                  //start IP stack
OK
AT+WIPBR=1,5                                 //open GSM bearer
OK
AT+WIPBR=2,5,2,"Phone number"                //set phone number for GSM bearer
OK
AT+WIPBR=2,5,0,"user name"                   //set user name
OK
AT+WIPBR=2,5,1,"passwd"                      //set password
OK
AT+WIPBR=4,5,0                               //start GSM bearer
OK
AT+WIPCREATE=2,1,"ip addr",80                //create a TCP client towards peer IP device @ "ip
                                             //addr", port 80
OK                                           //all parameters and iP stack behavior are OK
+WIPREADY: 2,1                               //unsolicited: the TCP client socket is connected to
                                             //the peer
AT+WIPDATA=2,1,1                             //exchange data on socket idx 1
CONNECT
…                                            //read, write
+++                                          //switch to AT mode
OK
AT+WIPCLOSE=2,1                              //close the TCP client socket index 1
OK
```

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9.2 UDP Socket

AT+WIPCFG=1	*//start IP stack*
OK	
AT+WIPBR=1,6	*//open GPRS bearer*
OK	
AT+WIPBR=2,6,11,"APN name"	*//set APN name of GPRS bearer*
OK	
AT+WIPBR=2,6,0,"user name"	*//set user name*
OK	
AT+WIPBR=2,6,1,"passwd"	*//set password*
OK	
AT+WIPBR=4,6,0	*//start GPRS bearer*
OK	
AT+WIPCREATE=1,1,80,"www.wavecom.com",80	*//create a UDP client towards peer IP device @ //"www.wavecom.com" , port 80*
OK	*//all parameters and IP stack behavior are OK*
+WIPREADY: 1,1	*//unsolicited: the UDP client socket is "pseudo" //connected to the peer (no //real connection is UDP)*
AT+WIPDATA=1,1,1	*//exchange data on socket idx 1:*
CONNECT	
…	*//read, write*
+++	*//switch to AT mode*
OK	
AT+WIPCLOSE=1,1	*//close the UDP socket index 1*
OK	
AT+WIPCREATE=1,1,1234	*//start a UDP server and listen for datagram on port //1234*
OK	*//all parameters and IP stack //behavior are OK*
+WIPREADY: 1,1	*//unsolicited: the UDP client socket is "pseudo" //connected to the peer (no real connection is UDP)*
+WIPDATA: 1,1,25,"192.168.0.2",2397	*//one datagram is ready to be read : it was sent from //192.168.0.2 on port //2397 and is composed of 25 //bytes*

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AT+WIPDATA=1,1,1	
CONNECT	
abcedghijklmnopqrstuvwxyz[ETX]	*//here 25 bytes + the [ETX] character (marking the //bound of the datagram) have been read.*
+++ or **AT+WIPDATA=1,1,0**	*//type on this UART "+++" escape sequence or un //map the UART on other control port (USB UART)*
OK	*//here UART is back to AT command mode. If some //other remote IP devices sent some one or more //datagrams while reading for the first one, then a //new datagram indication is received*
+WIPDATA: 1,1,50,"192.168.0.4",58	*//one datagram is ready to be read : it was sent from //192.168.0.4 on port 58 and is composed of 50 //bytes*
AT+WIPDATA=1,1,1	
CONNECT	
abcedghijklmnopqrstuvwxyzabced ghijklmnopqrstuvwxyz [ETX]	*//here 25 bytes + the [ETX] character (marking the //bound of the datagram) have been read.*

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9.3 PING

```
AT+WIPCFG=1                          //start IP stack
OK
AT+WIPBR=1,6                         //open GPRS bearer
OK
AT+WIPBR=2,6,11,"APN name"           //set APN name of GPRS bearer
OK
AT+WIPBR=2,6,0,"user name"           //set user name
OK
AT+WIPBR=2,6,1,"passwd"              //set password
OK
AT+WIPBR=4,6,0                       //start GPRS bearer
OK
AT+WIPPING="192.168.0.1"             //start PING session
OK
+WIPPING:0,0,224
```

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9.4 FTP

```
AT+WIPCFG=1                                   //start IP stack
OK
AT+WIPBR=1,6                                  //open GPRS bearer
OK
AT+WIPBR=2,6,11,"APN name"                    //set APN name of GPRS bearer
OK
AT+WIPBR=2,6,0,"user name"                    //set user name
OK
AT+WIPBR=2,6,1,"passwd"                       //set password
OK
AT+WIPBR=4,6,0                                //start GPRS bearer
OK
AT+WIPCREATE=4,1,"FTP                         //create FTP session
server",21,"username","passwd"
OK
AT+WIPFILE=4,1,2,"./filename.txt"             //upload file "filename.txt"
CONNECT
<data>
[ETX]
OK
AT+WIPFILE=4,1,1,"./filename.txt"             //download file "filename.txt"
CONNECT
<data>
[ETX]
OK
```

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9.5 HTTP

AT+WIPCFG=1	*//start IP stack*
OK	
AT+WIPBR=1,6	*//open GPRS bearer*
OK	
AT+WIPBR=2,6,11,"APN name"	*//set APN name of GPRS bearer*
OK	
AT+WIPBR=2,6,0,"user name"	*//set user name*
OK	
AT+WIPBR=2,6,1,"passwd"	*//set password*
OK	
AT+WIPBR=4,6,0	*//start GPRS bearer*
OK	
AT+WIPCREATE=5,1,"www.siteaddress.com",81,"username","password","header name"," header value"	*//connect to remote HTTP proxy server port 81 //with authentication and some header fields*
OK	
+WIPREADY: 5,1	*//connection and authentication are successful*
AT+WIPOPT=5,1,1,51	*//get size of the TCP send buffer size*
+WIPOPT:5,51,<sender buffer size>	
OK	*//get option successful*
AT+WIPOPT=5,1,2,53,6	*//set maximum number of redirects*
OK	

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AT+WIPFILE=5,1,1,"urlForGet","username","password","Accept","text/html","Transfer-codings","compress"	*//HTTP GET method*
CONNECT	
<user starts getting the mail with the UART in data mode and ends with an [ETX] >	
OK	
+WIPFILE: 5,1,1,255,"Found"	*//unsolicited string on the HTTP status code //and reason*

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9.6 SMTP

```
AT+WIPCFG=1                                          //start IP stack
OK
AT+WIPBR=1,6                                         //open GPRS bearer
OK
AT+WIPBR=2,6,11,"APN name"                           //set APN name of GPRS bearer
OK
AT+WIPBR=2,6,0,"user name"                           //set user name
OK
AT+WIPBR=2,6,1,"passwd"                              //set password
OK
AT+WIPBR=4,6,0                                       //start GPRS bearer
OK
AT+WIPCREATE=6,1,"192.168.1.2",25                    //connect to remote SMTP server
,"user","password"
OK
                                                     //connection and authentication are successful
+WIPREADY: 6,1
AT+WIPOPT=6,1,2,61,"sender@mail.c                    //set sender mail address
om"
OK
AT+WIPOPT=6,1,2,62,"sender name"                     //set sender name
OK
AT+WIPOPT=6,1,2,63,"                                 //set receiver mail address
rec01@mail.com, rec02@mail.com"
OK
AT+WIPOPT=6,1,2,64,"ccrec01@mail.                    //set CC receiver mail address
com, ccrec02@mail.com"
OK
AT+WIPOPT=6,1,2,65,"bccrec01@mail                    //set BCC mail address
.com, bccrec02@mail.com"
OK
```

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AT+WIPOPT=6,1,2,66,"mail subject"	*//set mail subject*
OK	
AT+WIPFILE=6,1,2	*//send mail*
CONNECT	
<user starts sending mail with the UART in data mode and ends with an [ETX] character >	
OK	

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9.7 POP3

```
AT+WIPCFG=1                                   //start IP stack
OK
AT+WIPBR=1,6                                  //open GPRS bearer
OK
AT+WIPBR=2,6,11,"APN name"                    //set APN name of GPRS bearer
OK
AT+WIPBR=2,6,0,"user name"                    //set user name
OK
AT+WIPBR=2,6,1,"passwd"                       //set password
OK
AT+WIPBR=4,6,0                                //start GPRS bearer
OK
AT+WIPCREATE=7,1,"192.168.1.2",11             //connect to remote POP3 server
0,"user","password"
OK
                                              //connection and authentication are successful
+WIPREADY: 7,1
AT+WIPOPT=7,1,1,71                            //get total number of mails
+WIPOPT: 7,71,10
OK
AT+WIPOPT=7,1,1,72                            //get total mail size
+WIPOPT: 7,72,124000
OK
AT+WIPFILE=7,1,1,"5"                          //retrieve mail id 5
CONNECT
<user starts getting the mail
with the UART in data mode and
ends with an [ETX] >
OK
```

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AT+WIPFILE=7,1,3,"1"	*//retrieve mail id 1 and delete it from the server //after retrieving*
CONNECT	
<user starts getting the mail with the UART in data mode and ends with an [ETX] >	
OK	

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9.8 Creating a TCP Server, spawning the maximum TCP Socket (for the configured Server)

AT+WIPCFG=1	*//start IP stack*
OK	
AT+WIPBR=1,6	*//open GPRS bearer*
OK	
AT+WIPBR=2,6,11,"APN name"	*//set APN name of GPRS bearer*
OK	
AT+WIPBR=2,6,0,"user name"	*//set user name*
OK	
AT+WIPBR=2,6,1,"passwd"	*//set password*
OK	
AT+WIPBR=4,6,0	*//start GPRS bearer*
OK	
AT+WIPCREATE=3,1,80,5,6	*//create the server on port 80, idx = 1. The //server is listening for connection request on //port 80.Spawned sockets will be given the //index 5 or 6. It will accept connection request //until it has no more socket left.*
OK	
+WIPACCEPT: 1,5	*//unsolicited: the server accepted a connection //resulting TCP client on idx 5.*
+WIPACCEPT: 1,6	*//unsolicited: the server accepted a connection //resulting TCP client on idx 6.*
AT+WIPCLOSE=2,5	*//close the spawned TCP client socket index 5.*
OK	*//now if the peer device try to connect to the //server it shall receive an accept () immediately ///followed by an shutdown() (connection reset //by peer)*

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9.9 Creating a Server and try to create a TCP Client/Server on a reserved index (reserved by the Server) will fail.

AT+WIPCFG=1	*//start IP stack*
OK	
AT+WIPBR=1,6	*//open GPRS bearer*
OK	
AT+WIPBR=2,6,11,"APN name"	*//set APN name of GPRS bearer*
OK	
AT+WIPBR=2,6,0,"user name"	*//set user name*
OK	
AT+WIPBR=2,6,1,"passwd"	*//set password*
OK	
AT+WIPBR=4,6,0	*//start GPRS bearer*
OK	
AT+WIPCREATE=3,2,80,1,2	*//create the server on port 80, idx=2. The server //is listening for connection request on port 80. //Spawned sockets will be given the index 1 or //2.It will accept connection request until has //nor more socket left.*
OK	
AT+WIPCREATE=2,3,"198.168.0.1",80	*//create a TCP client towards peer IP device @ //"198.168.0.1", port 80,*
OK	*//all parameters and IP stack behavior are OK.*
+WIPREADY: 2,3	*//unsolicited: the TCP client socket is connected //to the peer.*
+WIPACCEPT: 2,1	*//unsolicited: the server index accepted a //connection; resulting TCP client on idx 1*
AT+WIPDATA=2,3,1	*//exchange data on socket index 3*
CONNECT	
AT+WIPDATA=2,1,1	*//exchange data on socket index 1*
CONNECT	
[ETX]	*//send unescaped ETX character*
+WIPPEERCLOSE: 2,3	*//unsolicited: peer socket is closed*

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Examples of Application

Creating a Server and try to create a TCP Client/Server on a reserved index (reserved by the Server) will fail.

AT+WIPCLOSE=3,1	*//close TCP server socket index 1*
OK	
AT+WIPCREATE=3,2,81,2,3	*//create the server on port 81, idx=2 and from_idx=2 and to_idx=3*
+CME ERROR:845	*//TCP client socket with idx 2 was reserved by //the previous server socket and it was not //closed explicitly. Hence error is returned.*

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9.10 Create a TCP Client and try to create a TCP Server with indexs range containing TCP Client will fail.

AT+WIPCFG=1	*//start IP stack*
OK	
AT+WIPBR=1,6	*//open GPRS bearer*
OK	
AT+WIPBR=2,6,11,"APN name"	*//set APN name of GPRS bearer*
OK	
AT+WIPBR=2,6,0,"user name"	*//set user name*
OK	
AT+WIPBR=2,6,1,"passwd"	*//set password*
OK	
AT+WIPBR=4,6,0	*//start GPRS bearer*
OK	
AT+WIPCREATE=2,1,"198.168.0.1",80	*//create a TCP client towards peer IP device @ //"198.168.0.1", port 80*
OK	*//all parameters and IP stack behavior are OK.*
+WIPREADY: 2,1	*//unsolicited: the TCP client socket is connected //to the peer.*
AT+WIPCREATE=3,2,80,1,2	*//create the server on port 80, idx=2. Range //requested contains the already used index //"1" and hence error is returned.*
+CME ERROR: 845	

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9.11 Creating 8 UDP sockets, 8 TCP clients and 4 TCP servers.

AT+WIPCFG=1	*//start IP stack*
OK	
AT+WIPBR=1,6	*//open GPRS bearer*
OK	
AT+WIPBR=2,6,11,"APN name"	*//set APN name of GPRS bearer*
OK	
AT+WIPBR=2,6,0,"user name"	*//set user name*
OK	
AT+WIPBR=2,6,1,"passwd"	*//set password*
OK	
AT+WIPBR=4,6,0	*//start GPRS bearer*
OK	
AT+WIPCREATE=1,1,55,"192.168.0.1",75	*//create a UDP client towards peer IP device @ //"192.168.0.1", port 75.*
OK	*//all parameters and IP stack behavior are OK.*
+WIPREADY: 1,1	*//unsolicited: the UDP client socket is "pseudo //"connected to the peer (no real connection is // UDP)*
AT+WIPCREATE=1,2,56,"192.168.0.1",76	*//create a UDP client towards peer IP device @ //"192.168.0.1", port 76.*
OK	*//all parameters and IP stack behavior are OK.*
+WIPREADY: 1,2	*//unsolicited: the UDP client socket is "pseudo //"connected to the peer (no real connection is // UDP)*
AT+WIPCREATE=1,3,57,"192.168.0.1",77	*//create a UDP client towards peer IP device @ //"192.168.0.1", port 77.*
OK	*//all parameters and IP stack behavior are OK.*
+WIPREADY: 1,3	*//unsolicited: the UDP client socket is "pseudo //"connected to the peer (no real connection is // UDP)*
AT+WIPCREATE=1,4,58,"192.168.0.1",78	*//create a UDP client towards peer IP device @ //"192.168.0.1", port 78.*
OK	*//all parameters and IP stack behavior are OK*

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+WIPREADY: 1,4	*//unsolicited: the UDP client socket is "pseudo //"connected to the peer (no real connection is // UDP)*
AT+WIPCREATE=1,5,59,"192.168.0.1",79	*//create a UDP client towards peer IP device @ //"192.168.0.1", port 79.*
OK	*//all parameters and IP stack behavior are OK*
+WIPREADY: 1,5	*//unsolicited: the UDP client socket is "pseudo //"connected to the peer (no real connection is // UDP)*
AT+WIPCREATE=1,6,60,"192.168.0.1",80	*//create a UDP client towards peer IP device @ //"192.168.0.1", port 80.*
OK	*//all parameters and IP stack behavior are OK*
+WIPREADY: 1,6	*//unsolicited: the UDP client socket is "pseudo //"connected to the peer (no real connection is // UDP)*
AT+WIPCREATE=1,7,61,"192.168.0.1",81	*//create a UDP client towards peer IP device @ //"192.168.0.1", port 81*
OK	*//all parameters and IP stack behavior are OK*
+WIPREADY: 1,7	*//unsolicited: the UDP client socket is "pseudo //"connected to the peer (no real connection is // UDP)*
AT+WIPCREATE=1,8,62,"192.168.0.1",82	*//create a UDP client towards peer IP device @ //"192.168.0.1", port 82.*
OK	*//all parameters and IP stack behavior are OK*
+WIPREADY: 1,8	*//unsolicited: the UDP client socket is "pseudo //"connected to the peer (no real connection is // UDP)*
AT+WIPCREATE=1,9,63,"192.168.0.1",83	
+CME ERROR: 830	*//8 UDP sockets have been created and hence //9th attempt fails*
AT+WIPCREATE=3,1,80,1,1	*//create one server on port 80, idx = 1. One //TCP client socket is reserved on index 1*
OK	
AT+WIPCREATE=3,2,81,2,2	*//create one server on port 81, idx = 2. One //TCP client socket is reserved on index 2*
OK	
AT+WIPCREATE=3,3,82,3,3	*//create one server on port 82, idx = 3. One //TCP client socket is reserved on index 3*
OK	

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Examples of Application
Creating 8 UDP sockets, 8 TCP clients and 4 TCP servers.

AT+WIPCREATE=3,4,83,4,4	*//create one server on port 83, idx = 4. One //TCP client socket is reserved on index 4*
OK	
AT+WIPCREATE=3,5,84,5,5	*//4 TCP servers have been created and hence //creation of 5th TCP server socket fails*
+CME ERROR: 830	
AT+WIPCREATE=2,1,"192.168.0.1",80	*//create a TCP client socket towards peer IP //device @ "192.168.0.1", port 80. Index 1 is //reserved by server index and hence error is //returned.*
+CME ERROR: 845	
	//4 reserved TCP client sockets have been //spawned by their TCP server.
+WIPACCEPT: 1,1	*//unsolicited: the server index 1 accepted a //connection; resulting TCP client on idx 1*
+WIPACCEPT: 2,2	*//unsolicited: the server index 2 accepted a //connection; resulting TCP client on idx 2*
+WIPACCEPT: 3,3	*//unsolicited: the server index 3 accepted a //connection; resulting TCP client on idx 3*
+WIPACCEPT: 4,4	*//unsolicited: the server index 4 accepted a //connection; resulting TCP client on idx 4*
AT+WIPCREATE=2,5,"192.168.0.1",80	*//create a TCP client towards peer IP device @ //"192.168.0.1", port 80.*
OK	*//all parameters and IP stack behavior are OK*
+WIPREADY: 2,5	*//unsolicited: the TCP client socket is connected //to the peer.*
AT+WIPCREATE=2,6,"192.168.0.1",80	*//create a TCP client towards peer IP device @ //"192.168.0.1", port 80.*
OK	*//all parameters and IP stack behavior are OK*
+WIPREADY: 2,6	*//unsolicited: the TCP client socket is connected //to the peer*
AT+WIPCREATE=2,7,"192.168.0.1",80	*//create a TCP client towards peer IP device @ //"192.168.0.1", port 80*
OK	*//all parameters and IP stack behavior are OK*
+WIPREADY: 2,7	*//unsolicited: the TCP client socket is connected //to the peer*
AT+WIPCREATE=2,8,"192.168.0.1",80	*//create a TCP client towards peer IP device @ //"192.168.0.1", port 80.*
OK	*//all parameters and IP stack behavior are OK*
+WIPREADY: 2,8	*//unsolicited: the TCP client socket is connected //to the peer*
AT+WIPCREATE=2,8,"192.168.0.1",80	*//create a TCP client towards peer IP device @ //"192.168.0.1", port 80. Index 8 is already //used and corresponds to an active socket.*
+CME ERROR: 840	

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AT+WIPCREATE=2,9,"192.168.0.1",80	*//create a TCP client towards a peer IP device @ //"192.168.0.1", port 80. Index 9 is forbidden.*
+CME ERROR: 830	

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9.12 Changing the MAX_SOCK_NUM option value and try to create 8 UDP sockets, 8 TCP Client sockets and 4 TCP Server sockets.

AT+WIPCFG=1	*//start IP stack*
OK	
AT+WIPCFG=2,6,3	*//MAX_SOCK_NUM has been changed to 3*
OK	
AT+WIPCFG=4,1	*//save the changed configuration to flash*
OK	
AT+WIPCFG=0	*//close the IP stack*
OK	
AT+WIPCFG=1	*//start IP stack*
OK	
AT+WIPBR=1,6	*//open GPRS bearer*
OK	
AT+WIPBR=2,6,11,"APN name"	*//set APN name of GPRS bearer*
OK	
AT+WIPBR=2,6,0,"user name"	*//set user name*
OK	
AT+WIPBR=2,6,1,"passwd"	*//set password*
OK	
AT+WIPBR=4,6,0	*//start GPRS bearer*
OK	
AT+WIPCREATE=1,1,55,"192.168.0.1",75	*//create a UDP client towards peer IP device @ //"192.168.0.1", port 75.*
OK	*//all parameters and IP stack behavior are OK.*
+WIPREADY: 1,1	*//unsolicited: the UDP client socket is "pseudo //"connected to the peer (no real connection is // UDP)*
AT+WIPCREATE=1,2,56,"192.168.0.1",76	*//create a UDP client towards peer IP device @ //"192.168.0.1", port 76.*
OK	*//all parameters and IP stack behavior are OK.*

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Examples of Application
Changing the MAX_SOCK_NUM option value and try to create 8 UDP sockets, 8 TCP Client sockets and 4 TCP Server sockets.

+WIPREADY: 1,2	*//unsolicited: the UDP client socket is "pseudo //"connected to the peer (no real connection is // UDP)*
AT+WIPCREATE=1,3,57,"192.168.0.1",77	*//create a UDP client towards peer IP device @ //"192.168.0.1", port 77.*
OK	*//all parameters and IP stack behavior are OK.*
+WIPREADY: 1,3	*//unsolicited: the UDP client socket is "pseudo //"connected to the peer (no real connection is // UDP)*
AT+WIPCREATE=1,4,58,"192.168.0.1",78	*//create a UDP client towards peer IP device @ //"192.168.0.1", port 78.*
+CME ERROR: 838	*//maximum 3 sockets can be created as the //MAX_SOCK_NUM value has been changed to //3. Hence an attempt to create a fourth socket //returns error.*

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9.13 Creating 8 UDP sockets, 8 TCP Clients, 4 TCP Servers and either one FTP/HTTP/SMTP/POP3

AT+WIPCFG=1	*//start IP stack*
OK	
AT+WIPBR=1,6	*//open GPRS bearer*
OK	
AT+WIPBR=2,6,11,"APN name"	*//set APN name of GPRS bearer*
OK	
AT+WIPBR=2,6,0,"user name"	*//set user name*
OK	
AT+WIPBR=2,6,1,"passwd"	*//set password*
OK	
AT+WIPBR=4,6,0	*//start GPRS bearer*
OK	
AT+WIPCREATE=1,1,55,"192.168.0.1",75	*//create a UDP client towards peer IP device @ //"192.168.0.1", port 75.*
OK	*//all parameters and IP stack behavior are OK.*
+WIPREADY: 1,1	*//unsolicited: the UDP client socket is "pseudo //"connected to the peer (no real connection is // UDP)*
AT+WIPCREATE=1,2,56,"192.168.0.1",76	*//create a UDP client towards peer IP device @ //"192.168.0.1", port 76.*
OK	*//all parameters and IP stack behavior are OK.*
+WIPREADY: 1,2	*//unsolicited: the UDP client socket is "pseudo //"connected to the peer (no real connection is // UDP)*
AT+WIPCREATE=1,3,57,"192.168.0.1",77	*//create a UDP client towards peer IP device @ //"192.168.0.1", port 77.*
OK	*//all parameters and IP stack behavior are OK.*
+WIPREADY: 1,3	*//unsolicited: the UDP client socket is "pseudo //"connected to the peer (no real connection is // UDP)*
AT+WIPCREATE=1,4,58,"192.168.0.1",78	*//create a UDP client towards peer IP device @ //"192.168.0.1", port 78.*

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OK	*//all parameters and IP stack behavior are OK*
+WIPREADY: 1,4	*//unsolicited: the UDP client socket is "pseudo //"connected to the peer (no real connection is // UDP)*
AT+WIPCREATE=1,5,59,"192.168.0.1",79	*//create a UDP client towards peer IP device @ //"192.168.0.1", port 79.*
OK	*//all parameters and IP stack behavior are OK*
+WIPREADY: 1,5	*//unsolicited: the UDP client socket is "pseudo //"connected to the peer (no real connection is // UDP)*
AT+WIPCREATE=1,6,60,"192.168.0.1",80	*//create a UDP client towards peer IP device @ //"192.168.0.1", port 80.*
OK	*//all parameters and IP stack behavior are OK*
+WIPREADY: 1,6	*//unsolicited: the UDP client socket is "pseudo //"connected to the peer (no real connection is // UDP)*
AT+WIPCREATE=1,7,61,"192.168.0.1",81	*//create a UDP client towards peer IP device @ //"192.168.0.1", port 81*
OK	*//all parameters and IP stack behavior are OK*
+WIPREADY: 1,7	*//unsolicited: the UDP client socket is "pseudo //"connected to the peer (no real connection is // UDP)*
AT+WIPCREATE=1,8,62,"192.168.0.1",82	*//create a UDP client towards peer IP device @ //"192.168.0.1", port 82.*
OK	*//all parameters and IP stack behavior are OK*
+WIPREADY: 1,8	*//unsolicited: the UDP client socket is "pseudo //"connected to the peer (no real connection is // UDP)*
AT+WIPCREATE=1,9,63,"192.168.0.1",83	
+CME ERROR: 830	*//8 UDP sockets have been created and hence //9th attempt fails*
AT+WIPCREATE=3,1,83,1,1	*//create one server on port 83, idx = 1. One //TCP client socket is reserved on index 1*
OK	
AT+WIPCREATE=3,2,84,2,2	*//create one server on port 84, idx = 2. One //TCP client socket is reserved on index 2*
OK	
AT+WIPCREATE=3,3,85,3,3	*//create one server on port 85, idx = 3. One //TCP client socket is reserved on index 3*
OK	

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AT+WIPCREATE=3,4,86,4,4	*//create one server on port 86, idx = 4. One //TCP client socket is reserved on index 4*
OK	
AT+WIPCREATE=3,5,84,5,5	*//4 TCP servers have been created and hence //creation of 5th TCP server socket fails*
+CME ERROR: 830	
AT+WIPCREATE=2,1,"192.168.0.1",83	*//4 TCP server have been created and each of //them reserved 1 TCP client socket and hence //5th attempt of creating TCP server fails*
+CME ERROR: 845	
	//4 reserved TCP client sockets have been //spawned by their TCP server.
+WIPACCEPT: 1,1	*//unsolicited: the server index 1 accepted a //connection; resulting TCP client on idx 1*
+WIPACCEPT: 2,2	*//unsolicited: the server index 2 accepted a //connection; resulting TCP client on idx 2*
+WIPACCEPT: 3,3	*//unsolicited: the server index 3 accepted a //connection; resulting TCP client on idx 3*
+WIPACCEPT: 4,4	*//unsolicited: the server index 4 accepted a //connection; resulting TCP client on idx 4*
AT+WIPCREATE=2,5,"192.168.0.2",80	*//create a TCP client towards peer IP device @ //"192.168.0.2", port 80.*
OK	*//all parameters and IP stack behavior are OK*
+WIPREADY: 2,5	*//unsolicited: the TCP client socket is connected //to the peer.*
AT+WIPCREATE=2,6,"192.168.0.2",80	*//create a TCP client towards peer IP device @ //"192.168.0.2", port 80.*
OK	*//all parameters and IP stack behavior are OK*
+WIPREADY: 2,6	*//unsolicited: the TCP client socket is connected //to the peer*
AT+WIPCREATE=2,7,"192.168.0.2",80	*//create a TCP client towards peer IP device @ //"192.168.0.2", port 80*
OK	*//all parameters and IP stack behavior are OK*
+WIPREADY: 2,7	*//unsolicited: the TCP client socket is connected //to the peer*
AT+WIPCREATE=2,8,"192.168.0.2",80	*//create a TCP client towards peer IP device @ //"192.168.0.2", port 80.*
OK	*//all parameters and IP stack behavior are OK*
+WIPREADY: 2,8	*//unsolicited: the TCP client socket is connected //to the peer*
AT+WIPCREATE=2,8,"192.168.0.2",80	*//create a TCP client towards peer IP device @ //"192.168.0.2", port 80. Index 8 is already //used and corresponds to an active socket.*
+CME ERROR: 840	

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AT+WIPCREATE=2,9,"192.168.0.2",80	*//create a TCP client towards a peer IP device @ //"192.168.0.2", port 80. Index 9 is forbidden.*
+CME ERROR: 830	
AT+WIPCREATE=4,1,"ftp server",,"user name","password"	*//create FTP session using default port 21*
OK	*//FTP session is created successfully.*
AT+WIPCREATE=7,1,"POP3 server",,"user name","mail id"	
+CME ERROR: 840	*//attempt of creating a OP3 session returns an //error as already 1 FTP session is active.*
AT+WIPCLOSE=4,1	*//close FTP session*
OK	
+WIPPEERCLOSE: 4,1	*//unsolicited: FTP session is closed //successfully*
AT+WIPCREATE=7,1,"POP3 server",,"user name","mail id"	*//create POP3 session using default port 110*
OK	*//all parameters and IP stack behaviors are OK.*
+WIPREADY: 7,1	*//unsolicited: the POP3 session is created //successfully*

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9.14 Subscribe/Unsubscribe WIPSoft AT commands using WIPSoft Library API

```
#include "adl_global.h"   // Global includes
#include "wip_atcmd.h"    // WIP AT command services
#if __OAT_API_VERSION__ >= 400
const u16 wm_apmCustomStackSize = 4096;
#else
u32 wm_apmCustomStack[1024];
const u16 wm_apmCustomStackSize = sizeof(wm_apmCustomStack);
#endif

void adl_main ( adl_InitType_e InitType )
{
  TRACE (( 1, "Embedded Application : Main" ));
  /* subscribe to the +WIP AT commands set service */
  if ( wip_ATCmdSubsrcibe() == 0)  {
  /* The customer can write here its own application based on other
     plug -ins or its specific application target. */
    wip_ATCmdUnsubscribe();
  }
  else
  {
    /* Error while subscribing to WIP Soft library */
  }
}
```

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9.15 Creating TCP client and server sockets in the same Wireless CPU at the same time mapping or unmapping the UART to exchange the data between the sockets

AT+WIPCFG=1	*//start IP stack*
OK	
AT+WIPBR=1,6	*//open GPRS bearer*
OK	
AT+WIPBR=2,6,11,"APN name"	*//set APN name of GPRS bearer*
OK	
AT+WIPBR=2,6,0,"user name"	*//set user name*
OK	
AT+WIPBR=2,6,1,"passwd"	*//set password*
OK	
AT+WIPBR=4,6,0	*//start GPRS bearer*
OK	
AT+WIPCREATE=3,2,80,1,2	*//create the server on port 80, idx=2. The server //is listening for connection request on port 80. //Spawned sockets will be given the index 1 or //2.It will accept connection request until has //nor more socket left.*
OK	
AT+WIPCREATE=2,3,"198.168.0.1",80	*//create a TCP client towards peer IP device @ //"198.168.0.1", port 80,*
OK	*//all parameters and IP stack behavior are OK.*
+WIPREADY: 2,3	*//unsolicited: the TCP client socket is connected //to the peer.*
+WIPACCEPT: 2,1	*//unsolicited: the server index accepted a //connection; resulting TCP client on idx 1*
AT+WIPDATA=2,3,1	*//exchange data on socket index 3*
CONNECT	
abc+++	*//data sent to socket index 1 and switched to AT mode by giving +++*
OK	
AT+WIPDATA=2,1,1	*//exchange data on socket index 1*
CONNECT	

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```
abc+++                                  //data received from socket index 3

OK
```

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10 Error Codes

"+CMEE" AT error code	Description
800	invalid option
801	invalid option value
802	not enough memory
803	operation not allowed in the current WIP stack state
804	device already open
805	network interface not available
806	operation not allowed on the considered bearer
807	bearer connection failure : line busy
808	bearer connection failure : no answer
809	bearer connection failure : no carrier
810	bearer connection failure : no sim card present
811	bearer connection failure : sim not ready (no pin code entered, ...)
812	bearer connection failure : GPRS network failure
813	bearer connection failure : PPP LCP negotiation failed
814	bearer connection failure : PPP authentication failed
815	bearer connection failure : PPP IPCP negotiation failed
816	bearer connection failure : PPP peer terminates session
817	bearer connection failure : PPP peer does not answer to echo request
818	incoming call refused
819	error on Ping channel
820	error writing configuration in FLASH memory
821	error reading configuration in FLASH memory
822-829	reserved for future use
830	bad index
831	bad state
832	bad port number
833	bad port state

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"+CMEE" AT error code	Description
834	not implemented
835	option not supported
836	memory allocation error
837	bad protocol
838	no more free socket
839	error during channel creation
840	UDP/TCP socket or FTP/HTTP/SMTP/POP3 session is already active
841	peer closed, or error in the FTP connection
842	destination host unreachable (whether host unreachable, Network unreachable, response timeout)
843	connection reset by peer
844	stack already started
845	attempt is made to reserve/create a client socket which is already reserved/opened by TCP server/client
846	internal error: FCM subscription failure
847	WIP_BOPT_GPRS_TIMEOUT time limit expired before GPRS bearer connected
848	impossible to connect to the bearer
849	connection to the bearer has succeeded but a problem has occurred during the data flow establishment
850	unknown reason
851-859	reserved for future use
860	protocol undefined or internal error
861	username rejected by server
862	password rejected by server
863	delete error
864	list error
865	authentication error
866	server not ready error
867	POP3 email retrieving error
868	POP3 email size error

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"+CMEE" AT error code	Description
869-879	reserved for future use
880	SMTP sender email address rejected by server
881	SMTP recipient email address rejected by server
882	SMTP CC recipient email address rejected by server
883	SMTP BCC recipient email address rejected by server
884	SMTP email body send request rejected by server

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